Module 6
Remedy Selection and Documentation

Contents

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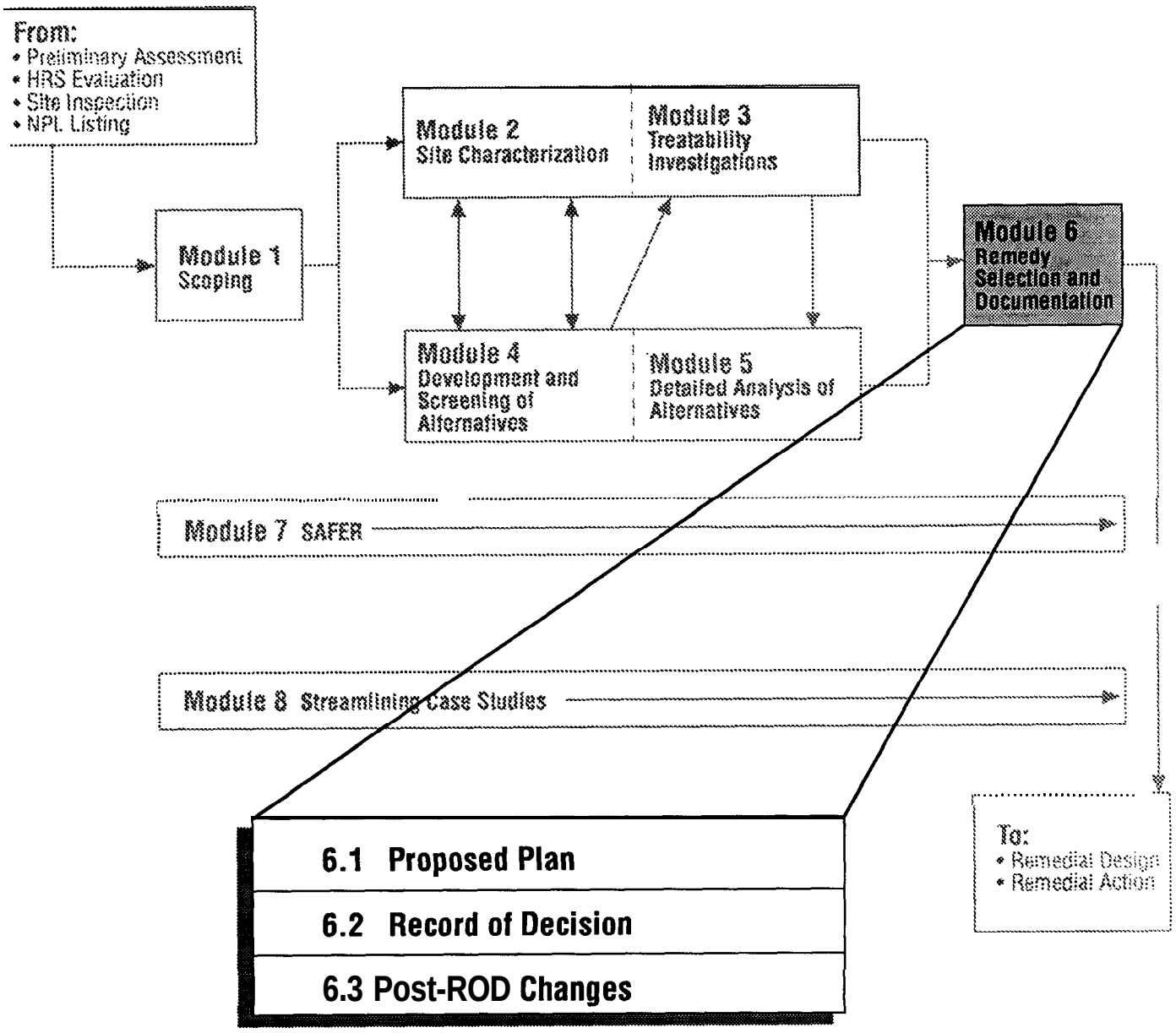

Module 6
Remedy Selection and Documentation

Purpose

To provide guidance on selecting a remedy and documenting the remedy selection process.

Background

Remedy selection and documentation is a process that ultimately results in a record of decision (ROD). This process serves many purposes and includes developing a legal document, accepting the Remedial Investigation/Feasibility Study (RI/FS) technical work and results, soliciting public involvement and acceptance, and selecting a remedy.

The ROD is a legally binding document. Therefore, the remedy selection and documentation process is highly procedural and must meet the many legal requirements specified in Section 300.430(f) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The ROD documents how the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) statutory mandates are met. Finally, the ROD sets the legal bounds for the remedial design and remedial action that are allowed without revisiting the remedy selection and documentation process.

The remedy selection and documentation process provides an opportunity for decisionmakers [e.g., appropriate staff from the Department of Energy (DOE) as lead agency, the Environmental Protection Agency (EPA) as lead regulatory agency, and the States as supporting agencies] to accept formally the RI/FS approach and results. This includes acceptance of the site model as a basis for remedy selection, risk assessment, applicable or relevant and appropriate requirements (ARARs) evaluation, and alternatives development and evaluation.

The remedy selection and documentation process provides an opportunity to solicit public involvement and acceptance and includes obtaining public review and comment on the FS and the Proposed Plan. The public's response often results in modifications to the preferred alternative (i.e., pre-ROD change). As a result of this review and comment, the NCP State and community acceptance criteria can be documented in the ROD.

The final purpose of the process is for the decisionmakers to select a remedy using the nine NCP criteria: overall protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; State acceptance; and community acceptance. Remedy selection must ensure that the selected remedy is flexible enough to accommodate the changes that normally occur during implementation. Remedy selection concludes with sign-off by the lead agencies, which documents that all purposes have been fulfilled.

[Note: EPA is currently revising the "Guidance on Preparing Decision Documents." Once issued, DOE will provide updates to this module, as appropriate.]

Organization

Module 6 is divided into three submodules

6.1 Proposed Plan
6.2 Record of Decision
6.3 Post-ROD Changes


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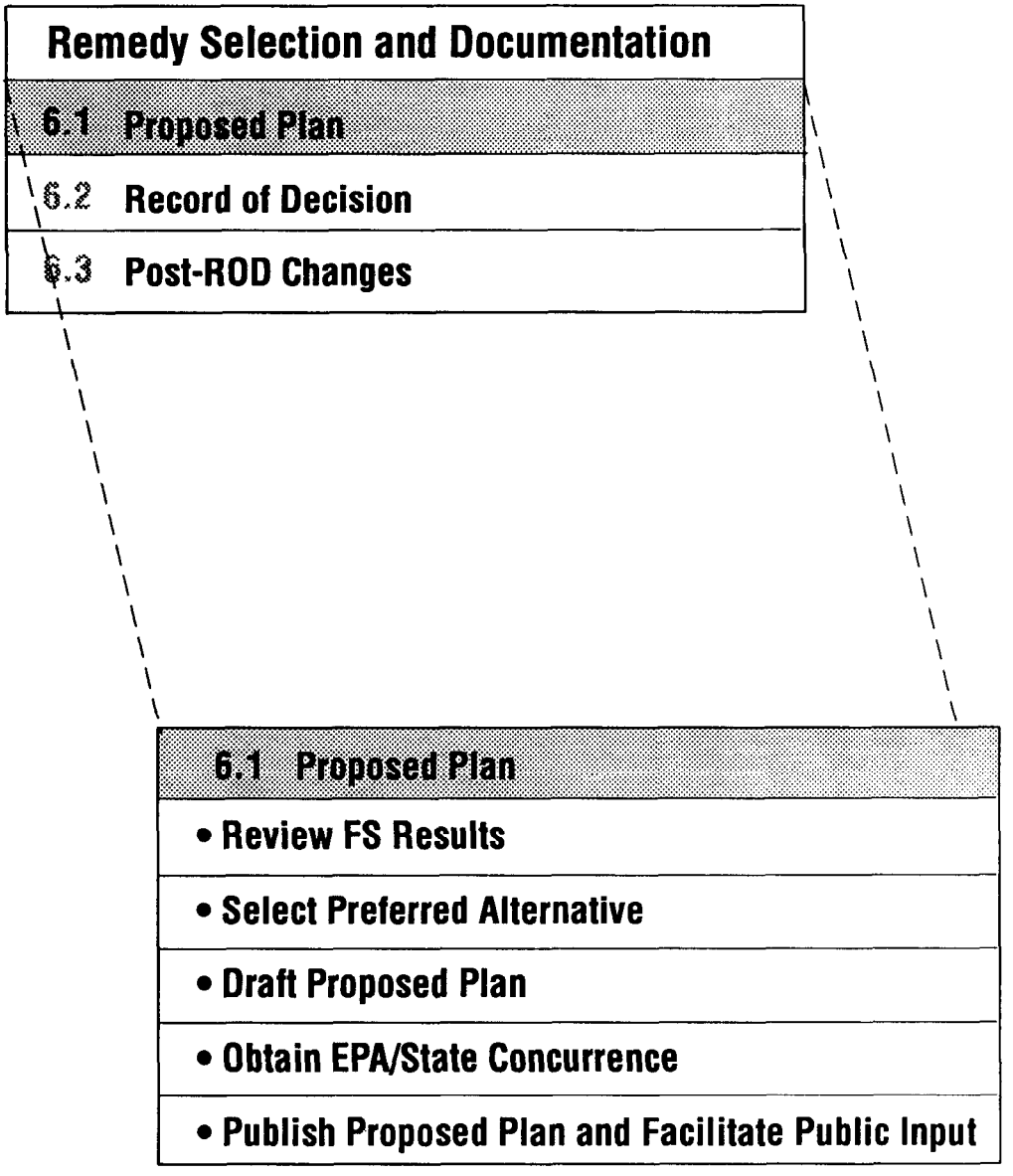
Documents

Remedy selection and documentation results in the development of two formal documents: the Proposed Plan and the ROD. Progress and changes are communicated in informal documents to the extended project team during the post-ROD phase, and to stakeholders in a formal document–the Explanation of Significant Differences (ESD).

Submodule 6.1 Proposed Plan



Submodule 6.1 Proposed Plan

Purpose

To provide guidance on identifying a preferred alternative and preparing the Proposed Plan.

Background

The purpose of the Proposed Plan is to solicit public involvement and acceptance of the alternatives as required in CERCLA Section 121. EPA Guidance (1988) describes, section by section, what the Proposed Plan should contain and provides an outline and suggested wording for several required sections. Proposed Plans should be brief, simply outlining the nature and extent of contamination at the site, the alternatives evaluated, and the preferred approach to remediation. The Proposed Plan generally is issued concurrently with the FS report. The executive summaries of previous reports (e.g., RI, risk assessment, FS) can serve as the basis of the Proposed Plan.

The DOE project manager or designee should be familiar with the following five items about the Proposed Plan:

- The Proposed Plan is a key point in the CERCLA process for formal input from the general public. This is because the Proposed Plan provides the first opportunity to comment on a specific, preferred approach to remediation.

- The Proposed Plan identifies the preferred alternative, but it must present all of the alternatives in addition to the preferred alternative. The preferred alternative has to be understood on its own merit, as well as in the context of the range of feasible approaches considered in the FS. Presentation of the range of alternatives developed in the FS is crucial to effective public input. The Proposed Plan should emphasize that comments are sought on all of the alternatives and on the information that supports the remedy selection process. This is important because DOE may decide to select a different remedy based on the comments or on changing circumstances.

- The preferred alternative is often changed in response to public comments. One of the most valuable functions of the Proposed Plan is to solicit the public comments that will be used in defining the selected remedy. These modifications are an anticipated and normal part of the process.

- Maintaining flexibility to manage deviations that occur during Remedial Design/Remedial Action (RD/RA) is critical to streamlining the CERCLA process [e.g., implementing the Streamlined Approach for Environmental Restoration (SAFER)]. Important to this first step in establishing the remedial approach is to identify the preferred alternative in flexible terms. The alternatives developed in the FS for the purposes of the detailed analysis are not appropriate examples for a preferred alternative in a Proposed Plan. The preferred alternative in the Proposed Plan should be developed on a general basis (e.g., broad technology families) to preserve flexibility for managing deviations during RD/RA. As such, the descriptions of alternatives in the Proposed Plan may be more general than the descriptions in the FS Report (see Module 5).

- Certain elements are required. They are discussed in the steps of this submodule.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Organization

Submodule 6.1 discusses the following:

- Review FS results
- Select Preferred Alternative
- Draft Proposed Plan
- Obtain EPA/State Concurrence
- Publish Proposed Plan and Facilitate Public Input

In addition, more detailed information is provided in the following notes:

- Note A–Outline for Proposed Plans
- Note B–Example Proposed Plan
- Note C–Example Notice of Availability
- Note D–Contents of Administrative Record

Sources

1. U.S. DOE, November 1991, *Public Participation in Environmental Restoration Activities*, DOE/EH-0221.

2. U.S. EPA, 1988, *Community Relations in Superfund: A Handbook*, Interim Version, EPA/540/G-88/002, OSWER Directive 9230.0.3B.

3. U.S.EPA, September 1988, *Administrative Records Fact Sheet.*

4. U.S. EPA, 1989, *Interim Guidance on Administrative Records for Selection of CERCLA Response Actions*.

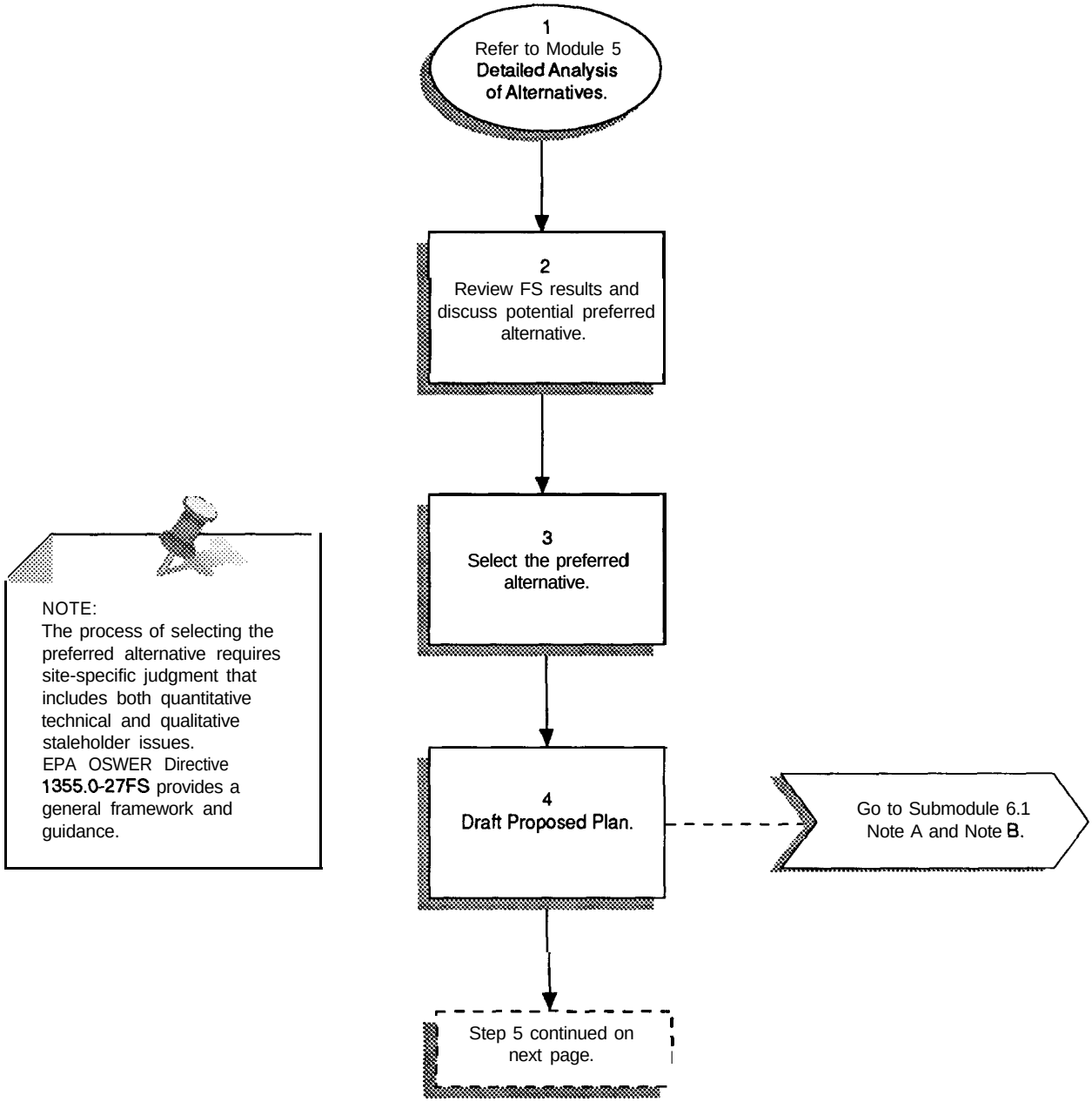
5. U.S. EPA, July 1989, *Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences,* and *The Record of Decision Amendment*, Interim Final, EPA/540/G89/007, OSWER Directive 9355.3-02.

6. U.S. EPA, November 1989, *Guide to Developing Superfund Records of Decision*, OSWER Directive 9335.3-02FS-1.

7. U.S. EPA, April 1990, *Guide to Selecting Superfund Remedial Actions,* OSWER Directive 9355.0-27FS.

8. U.S. EPA, May 1990, *Guide to Developing Proposed Plans*, OSWER Directive 9335.2-02FS-2.

Submodule 6.1 Proposed Plan



Step 1. Refer to Module 5, Detailed Analysis of Alternatives.

Step 2. **Review FS results and discuss potential preferred alternatives.** The extended project team that has been actively involved in the RI/FS will generally choose to be included in the effort to review draft FS results and to identify potential preferred alternatives. Other stakeholders also may choose to take an active interest in the project at this point and should be solicited. Inviting stakeholders to participate in these initial discussions is considered a positive step. Selected parts of the (pre-publication) draft of the FS can be shared with the stakeholders to provide necessary information on the site and the alternatives evaluated. An exchange of views prior to drafting the Proposed Plan helps to identify issues that must be considered in developing a preferred alternative. Example issues may include terms of compliance agreements and unacceptable approaches (e.g., leaving high-level waste in place).

Step 3. **Select the preferred alternative.** The NCP describes a general framework for selecting the preferred alternative. The selection process requires a judgment about the most appropriate method of achieving protection of human health and the environment. The selection process must meet statutory requirements of CERCLA Section 121 in addition to meeting NCP requirements in Section 300.430. Because this process is highly subjective (i.e., includes both quantitative technical and qualitative stakeholder issues) and requires site-specific judgment, EPA (rather than developing specific guidance) has developed guidance on a general framework used to select a preferred alternative (EPA OSWER Directive 9355.0-27FS).

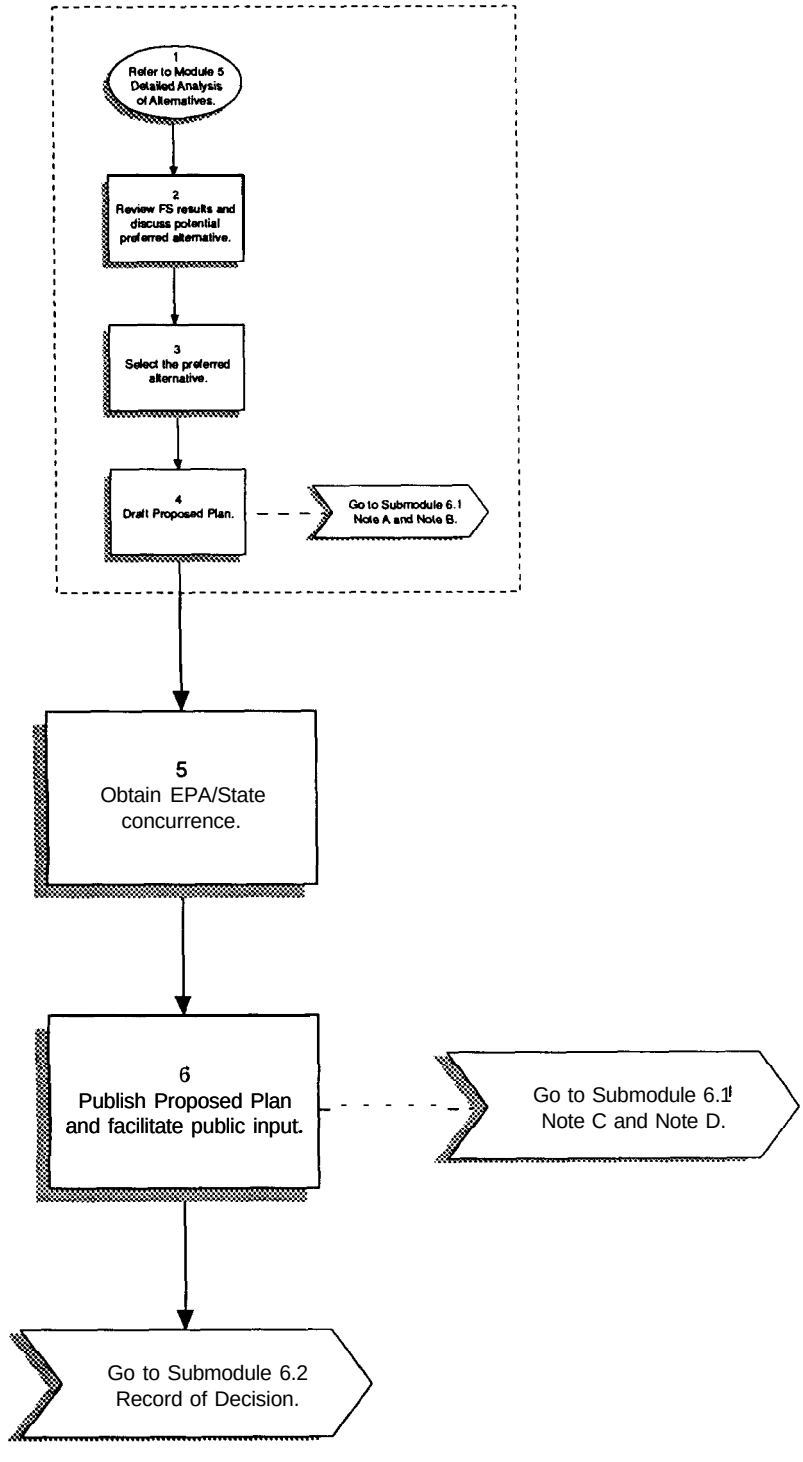
Step 4. **Draft Proposed Plan.** DOE is responsible for drafting the Proposed Plan. Submodule 6.1, Notes A and B provide an outline, suggested language, and an example Proposed Plan. The Proposed Plan should be quite brief. While there are several required elements, even the most complex issues (e.g., the nature and results of the risk assessment) can be handled very briefly by presenting only the relevant results of the RI/FS. Stakeholders who desire additional detail can consult the RI and/or FS reports. The Proposed Plan can be developed in a fact sheet format or in a slightly expanded format that provides additional details.

Certain elements must be included in the Proposed Plan. The example outline and the example Proposed Plan (provided in Submodule 6.1, Notes A and B) should be consulted for a complete listing. Several of the specific requirements are noted as follows:

- A specific "Finding of Risk" paragraph must be included in any Proposed Plan, concluding that remedial action is necessary.

- The alternatives must be presented on the basis of the two threshold criteria (overall protection of human health and the environment, and compliance with ARARs) and the five balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost) presented in Module 5. The presentation focuses on the important differences among the alternatives, emphasizing the five balancing criteria rather than presenting an exhaustive summary of the detailed analysis in the FS.

Submodule 6.1 Proposed Plan (cont.)



- A belief that the preferred alternative represents the best approach on the basis of the five balancing criteria.

- A belief that the preferred alternative will meet the CERCLA expectations for protectiveness, ARARs compliance, cost-effectiveness, permanence, and use of treatment to the maximum extent practicable. If one or more of the CERCLA requirements will not be met (e.g., the preference for use of treatment-based alternatives), the Proposed Plan needs to be explicit on that point and explain briefly why the expectation cannot be met.

- Public participation information consisting of the who, what, when, and how needed to enable public comment on the preferred alternative and the supporting data.

- Specific statements of the EPA and State regulatory agency positions regarding the preferred alternative and other aspects of the Proposed Plan. The State's position on the preferred alternative constitutes the basis for evaluation of the eighth criterion, "State Acceptance."

- If an innovative technology is selected, provide a description of the proposed contingent remedy.

In addition to these issues, the Proposed Plan must provide a perspective on the operable unit (OU) being addressed, its relationship to any other OUs at the site, and the relationship of the remediation to the overall site cleanup. Finally, certain regulations require specific opportunity for public comment. If any of these regulatory options will be used, the Proposed Plan must note for which alternatives the options will be used and specifically solicit public comments on all alternatives that use the option. For example, land disposal restriction (LDR) treatability variances under 40 CFR 268.44 and Corrective Action Management Units (CAMUs) 40 CFR 264.552 are two ARARs for which specific comments must be elicited.

Step 5. **Obtain EPA/State Concurrence.** EPA must sign the ROD; in addition, the State agency may hold a near-veto power over the remedy selection and has the right to sign the final ROD. Knowledge of EPA and State positions on the preferred alternative and other details of the Proposed Plan is advantageous prior to publication. Concurrence among all parties is not required at this point (though it would be helpful), but there may be instances when it is useful to present an alternative for public comment that the agencies have not yet agreed to. However, it will most often be valuable for EPA and the State to agree prior to publishing the Proposed Plan. The DOE project manager or designee must arrange for review and comment opportunities for the regulatory agencies during preparation of the Proposed Plan.

Step 6. **Publish Proposed Plan and Facilitate Public Input.** The Proposed Plan must be made available to anyone who requests a copy. A newspaper notice of the availability of the Proposed Plan and the time and place of a public meeting is required (see Submodule 6.1, Note D). The seven required sections of the newspaper notice are as follows: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- Site name and location
- Date and location of a public meeting
- Identification of lead and support agencies
- Alternatives evaluated in the detailed analysis
- Identification of the preferred alternative
- Request for public comments
- Public participation information

The DOE project manager or designee must make arrangements for the public meeting. The development of an Administrative Record is required by the NCP. The Administrative Record is a compilation to be made available to the public during the comment period. The public meeting is arranged for and held by DOE. The public review period is a minimum of 30 days (NCP requirement), but a longer period may be appropriate for some OUs. Additional information on DOE responsibilities is given in *Community Relations in Superfund: A Handbook*, Interim Guidance (EPA, 1989). Specific guidance on the preparation and contents of the Administrative Record is given in *Interim Guidance on Administrative Records for Selection of CERCLA Response Actions* (EPA, 1989), in the Subpart I of NCP, and in Chapter 6 of the EPA community relations handbook.

The Administrative Record should consist of documents that DOE considered or relied on to select the response action, and documents that demonstrate the public's opportunity to participate in the selection of the response action. Submodule 6.1, Note E, provides a list of documents typically included in an Administrative Record.

Public input on the Proposed Plan constitutes the basis for evaluation of the ninth criterion, "Community Acceptance."


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Note A. Outline for Proposed Plans.

Introduction

- Provide site name and location.
- Identify lead and support agencies.
- Introduce document's purpose, which is to:
  - fulfill requirements of CERCLA Section 117(a);
  - describe alternatives analyzed;
  - identify preferred alternative and explain rationale for preference;
  - serve as companion to the RI/FS Report and Administrative Record file; and
  - solicit public involvement in selection of a remedy.

- Stress importance of public input on all of the alternatives.

Site Background

- Provide brief overview of site.
- Describe site history.

Scope and Role of Operable Unit or Response Action

- Describe scope of problem that the action will address.
- Describe role of action within site strategy.
- Identify how action addresses principal threat(s).

Summary of Site Risks

- Provide overview of baseline risk assessment, by describing the:
  - contaminated media;
  - contaminant(s) of potential concern;
  - baseline exposure scenarios (e.g., routes of exposure, current and future land-use scenarios); and
  - current and potential site risks (including both carcinogenic and noncarcinogenic threats).

- Discuss how current risks compare with remediation goals;

- Discuss environmental risk(s), as appropriate.

Summary of Alternatives

- Provide narrative description of alternatives evaluated in detailed analysis of FS (including engineering components, treatment components, institutional controls, estimated present-worth cost, estimated construction and operation and maintenance costs, quantities of waste, implementation time, and the major ARARs associated with the alternative(s)).

Evaluation of Alternatives and the Preferred Alternative

- Identify the preferred alternative.


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- Introduce the nine NCP evaluation criteria and discuss how they are used to analyze cleanup options.
- Provide the rationale for the preferred alternative by profiling it against the nine evaluation criteria and highlighting how it compares with major advantages and disadvantages of the other alternatives. State/support agency and community acceptance should be addressed to the extent of the availability of adequate information.
- Discuss the lead agency's belief that the preferred alternative would satisfy the statutory findings, including the preference for treatment as a principal element.
- When the support agency concurs with the preferred alternative, also include its recommendation that the alternative meets the statutory findings.

Community Participation

- Provide notice of public comment period, encouraging written comments.
- Note time and place for a public meeting(s) (if they have been scheduled) or offer opportunity for meeting.
- Identify the location of the Administrative Record and information repositories.


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Note B. **Example Proposed Plan.** Proposed Plans are the first compliance documentation required during the remedy selection phase following the RI/FS. The purpose of the Proposed Plan is to describe the site and the risks it poses, to describe the alternatives that have been analyzed and the results of the analysis, and to present the preferred alternative. The preferred alternative is based on the detailed analysis of alternatives performed during the FS.

Proposed Plans play a critical role as a community relations document. They should be developed so that the public can read and understand the reasoning behind the selection of the preferred alternative. Two formats are acceptable: fact sheet format and expanded format. The choice between formats depends on site-specific conditions. Factors that should be considered in selecting a format include which will be most useful to the public and which format provides the best means of documenting the selection rationale. Enabling the public to anticipate which modifications may be necessary during remedial action is important because it is the deciding factor between whether an ESD or a ROD Amendment will be required to document a significant post-ROD change.

Other key issues that should be considered when developing a Proposed Plan include: (1) ensuring that the design engineers will have sufficient flexibility, (2) considering the appropriateness of a contingent remedy (see Submodule 6.2), (3) including an uncertainty analysis, and (4) addressing ARARs issues and, as appropriate, ARARs waivers.

This example Proposed Plan is not from a DOE facility. It was developed under a compliance agreement with EPA and State regulatory authorities. The text is unedited but has been reformatted to facilitate development of this note.

The following example Proposed Plan is for a site in Chehalis, Washington, It includes most of the elements of a Proposed Plan as listed in this submodule and in Note A. Although some of the necessary elements have to be read into the language of the plan, it is a good example of a Proposed Plan. Specifically, the major ARARs associated with each alternative are not laid out clearly (though there is some discussion of ARARs for most of the alternatives); the quantities of wastes to be treated are not given; the lead agency determination that the preferred alternative would satisfy the statutory expectations is not as clear and unequivocal as it could be; there is no finding by the support agency that the preferred alternative would meet the statutory expectations; and the "finding of risk" language is not as clear as desirable. The required language for the finding of risk is given in EPA guidance as:

> "Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected by this Proposed Plan, may present a current or potential threat to public health, welfare, or the environment."

Figures have been omitted from this example.


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Superfund Fact Sheet
The Proposed Plan

Coal Creek Site
Chehalis, Washington

Public Comment Period on Cleanup Alternatives
May 7 to July 6, 1990

Provide notice of public comment period.

Public Meeting to Discuss Cleanup Alternatives
June 6, 1990, 7:00 p.m.
Lewis County Courthouse, Conference Room 2 and 3
345 West Main, Chehalis, Washington

Note time and place for a public meeting.

Introduction

Purpose of proposed plan.

This Proposed Plan identities the U.S. Environmental Protection Agency's (EPA) preferred option for cleaning up the contaminated soils, perched groundwater, and special features at the Coal Creek site in Chehalis, Washington (also known as Ross Electric). This plan also summarizes the other cleanup alternatives considered for this site. EPA, in consultation with the Washington State Department of Ecology (Ecology), will select a cleanup remedy only after the public comment period has ended and the comments received have been reviewed and considered.

Identify lead and support agencies.

This document summarizes information, which is presented in greater detail in the Remedial Investigation and Feasibility Study (RI/FS) report and other documents in the administrative record file for this site. The administrative record file contains information that will be used in the selection of the final cleanup. The report and record are available for public review at the following locations:

Identify the location of the Administrative Record and information repositories.

Chehalis-Timberland Public Library
76 N.E. Park
Chehalis, Washington 98532

U.S. Environmental Protection Agency Library
Region 10
Park Place Building
1200 Sixth Avenue, 10th Floor Library
Seattle, Washington


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Please note that this proposed plan has been identified as the agency's initial recommendation, and EPA needs your input to develop a final remedy. We encourage you comments on all of the alternatives as well as the preferred alternative. EPA will only select a final remedy after the public comment period from May 7 to July 6, 1990 has ended and comments submitted have been reviewed and considered. Written comments should be sent to:

Solicit public involvement in selection of a remedy.

Stress importance of public input on all alternatives.

Bill Glasser, Project Manager
U.S. Environmental Protection Agency
1200 Sixth Avenue (MIS: HW-093)
Seattle, Washington 98101

Site History

The eight-acre Coal Creek site is located adjacent to Coal Creek, approximately one mile northeast of Chehalis, Washington (see map on page 2). The site has been owned primarily by public utilities since the early 1900s and is currently owned by the Lewis County Public Utility District. From 1949 to 1983, the site was leased to Economy Transformer Company, Spokane Transformer Company, and Ross Electric of Washington. These operators used the site for manufacturing, repairing, recycling, and scrapping of transformers and other electrical equipment.

Site name and location.

Describe site history.

During salvage operations, transformer fluid containing polychlorinated biphenyls (PCBs) was drained or spilled onto the site. Due to the persistent nature of PCBs, significant concentrations are still onsite. Other organic compounds and metals have also been found on the site as a result of the handling and/or disposal of scrap electrical equipment, ash, and oils.

The prominent site feature is a mound of fill material located in the northeast corner of the site. This mound covers approximately one-fourth of the total site area and is composed of 2 to 8 feet of fill material including native clay soils, ash, and mixed debris from the transformer scrapping operations. A 1- to 2-foot-thick sand and gravel cover has been placed over the fill as a working surface for vehicle access.

Provide brief overview of the site.

Special features at the site include a shop building, gasoline pump and underground gas tank, septic tank and leach-field, underground oil storage tank and oil-water separator, and several subsurface drains. A drainage ditch extends from the southwest corner of the fill mound and meanders through the wetlands to the west where it discharges to Coal Creek. These features and their approximate locations are noted in Figure 1.

Figure omitted.

Ecology and EPA have conducted investigations of the Coal Creek site in an effort to identify contamination related to past site activities. EPA issued a Consent Order under its Superfund authorities in mid-February 1988 requiring the potentially responsible parties to conduct an investigation to determine the nature and extent of contamination called a Remedial


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Investigation (RI). They were also required to evaluate cleanup alternatives, a process called a Feasibility Study (FS). The potentially responsible parties include former owners and operators and generators of the salvaged material. The RI/FS report represents the results of the investigation, an assessment of the potential risks to human health and the environment, and describes the alternatives evaluated for site cleanup. The significant findings of the RI/FS are summarized below: • **onsite soils** in and around the fill mound area are contaminated with PCBs, chlorobenzenes, lead and copper. PCB concentrations in surface soil on the fill mound range from one part per million (ppm) in the northwest corner to 1,000 ppm in the southwest corner. PCB concentrations are highest between depths of 2 and 8 feet, reaching 21,000 ppm. The highest concentration of lead, copper, and chlorobenzenes were detected in the southwest corner of the fill mound at concentrations of 3800 ppm, 31,000 ppm, and 23 ppm respectively. • **groundwater** entrained in the fill mound (perched groundwater) is contaminated with PCBs, and chlorobenzenes. Two of eleven monitoring wells situated adjacent to and downgradient from the fill mound (MW-7 and MW-8) had PCB contamination at levels of one part per billion (ppb). Chlorinated benzene compounds were detected at 15 ppb in groundwater samples taken from MW-7. • **containers** such as the septic tank, oil storage tank, and oil/water separator are partially filled with liquids/sludges contaminated with PCBs, chlorobenzenes and polynuclear aromatic compounds. Samples from the oil storage tank revealed the presence of PCBs in levels ranging from 450 to 540 ppm. The contaminant trichlorobenzene was present at a concentration of 325 ppm. Sediment samples taken from the oil-water separator had 250 ppm PCBs and 17 ppm chlorobenzenes. • **site building** contains friable asbestos materials requiring abatement. • **sediments** in the drainage ditch are contaminated with PCBs. Concentrations are highest immediately adjacent to the fill mound where levels in floating oil, sediment and surface water reached concentrations of 9300 ppm, 3200 ppm, and 23 ppm respectively.	**Describe scope of problem the action will address.**


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- the **Coal Creek ecosystem** has not been significantly impacted by discharges of contaminants from the site. Sampling of Coal Creek sediments did not reveal PCB contamination above the .2 ppm analytical detection limit.

Discuss environmental risks, as appropriate.

- portions of the site (including highly contaminated soils in the fill mound area) lie within the 100 year floodplain and are impacted by flood events.

Summary of Site Risks

PCBs are the contaminant that pose the greatest risk of causing cancer and other adverse health effects. Skin contact or ingestion of surface soils are the most likely routes of exposure to PCBs at this site. Sampling of surface soils from 0 to 2.5 feet at the site found an average concentration of 162 parts per million (ppm) of PCBs. This concentration level is associated with an excess lifetime cancer risk of three in one thousand for long term residential exposures to seven in ten thousand for shorter term industrial exposures. This means that if no cleanup action is taken by EPA, three persons in one thousand have the chance of contracting cancer as a result of lifetime exposure to PCB contaminated soil on the site. This estimate was developed by taking into account various conservative assumptions about the likelihood of a person being exposed to site soils or waters. A detailed description of the assumptions can be found in the baseline risk assessment section of the RI report and the EPA supplement to the risk assessment.

Contaminant of concern, routes of exposure, contaminated media.

Baseline exposure scenarios.

Potential site risks.

EPA believes that a combination of treatment and containment technologies would significantly reduce the potential threats to human health and the environment. The proposed cleanup actions described in this plan are designed to reduce the likelihood of exposure to site contaminants and ensure that contaminants are not transported into groundwater, surface water, or air. The EPA preferred alternative would reduce site associated risk for excess lifetime cancers to one in ten thousand for residential exposures and one in one hundred thousand for industrial exposures.

Identify how actions address principal threats.

Remediation goals (for comparison with current risks).

Summary of Alternatives

Summary of Alternatives.

A total of nine cleanup options were considered in the Feasibility Study for their effectiveness in cleanup of contaminated soils, groundwater, and special features at the Coal Creek site. They are listed below:

- **Alternative 1:** no action
- **Alternative 2:** capping of fill mound soils and demolition debris, surface water controls, groundwater monitoring
- **Alternative 3:** capping of fill mound soils and demolition debris, collection and offsite treatment of perched groundwater, surface water controls, groundwater monitoring


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- **Alternative 4:** excavation and onsite incineration of fill mound soils, capping of incinerator ash and unregulated demolition debris
- **Alternative 5:** treatment by solvent extraction of fill mound soils, capping of treated soils and unregulated demolition debris
- **Alternative 6:** treatment by chemical dechlorination of fill mound soils, capping of treated soils and unregulated demolition debris
- **Alternative 7:** offsite disposal of fill mound soils at a permitted hazardous waste landfill, containment of residual soil contamination under a soil cover
- **Alternative 8:** onsite stabilization of fill mound soils, capping of treated soils, residual soil contamination and unregulated demolition debris, surface water controls, groundwater monitoring
- **Alternative 9:** in-situ vitrification of contaminated soils, containment of residual soil contamination and unregulated demolition debris under a soil cover

Common Elements of All Alternatives

Except for the "no action" alternative, all of the alternatives evaluated for the site would include a number of common components. All alternatives include asbestos removal operations in the site building, building demolition, and disposal of both asbestos and building remains in an approved landfill. All alternatives involve the treatment of container liquids offsite except onsite incineration. Alternatives 2, 3, and 8 involve the construction of surface water diversion ditches and/or curtain drains to lower the groundwater table.

Engineering components.

Treatment components.

Summary of Alternatives Analyzed in Detail

Alternative 2: ***Capping, surface water controls, groundwater monitoring*****.**

Capital Cost	$600,000
O&M	$44,800
Present Worth	$1,300,000

This alternative requires construction of a multi-layered cap over contaminated fill mound soils with PCB concentrations greater than 1 ppm. The cap would prevent direct contact, control generation of dust and prevent rainwater flowing through the soil. Contaminated soils from the drainage ditch, subsurface drains, and leach field would be placed on the fill mound prior to capping. Debris from demolition of the onsite building would be


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contained onsite under the cap if shown to have PCB concentrations less than 50 ppm.

Drainage channels would be constructed around the fill mound to control surface water and prevent groundwater from rising into the area of greatest contamination. Deed restrictions would prevent future residential land use and the use of shallow groundwater for drinking water. Long-term groundwater monitoring would be required.

Institutional controls.

Alternative 3: ***Capping, surface water controls, groundwater monitoring, collection and offsite treatment of perched groundwater.***

Capital Cost	$690,000
O&M	$50,700
Present Worth	$1,500,000

Operation and maintenance costs; estimated present-worth costs.

This alternative is the same as alternative 2, except it includes the collection and treatment of perched groundwater from within the fill mound. The groundwater would be collected in trenches installed along the fill mound. Groundwater would be captured and channeled to holding tanks, which would be pumped out regularly and treated offsite.

Alternative 4: ***Incineration of soils, capping of treatment residuals, and demolition debris.***

Capital Cost	$6,300,000
O&M	$0
Present Worth	$6,300,000

Under this alternative, contaminated soils and sediments with PCB levels greater than 10 ppm would be incinerated onsite. Perched groundwater in the fill would also be incinerated. Ash from the incineration process and soil containing from 1 to 10 ppm PCBs would be contained on site under a cap.

Alternative 5: ***Onsite solvent extraction of fill mound soils, capping of treated soils and demolition debris.***

Capital Cost	$4,140,000
O&M	$0
Present Worth	$4,140,000

In this alternative the soils and sediments above 10 ppm would be excavated, washed with an organic solvent to remove PCBs, placed back onsite and contained under a soil cap. The treatment will remove PCBs from the soils and perched groundwater and concentrate them into a solvent. The solvent would be incinerated offsite. Depending on the final concentration of PCBs in the treated soils, long-term monitoring and deed restrictions as described in Alternative 2 may be required.


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Alternative 6: ***Onsite chemical dechlorination of fill mound soils, capping of treated soils and demolition debris.***

Capital Cost	$7,500,000
O&M	$0
Present Worth	$7,500,000

Under this option, contaminated soils and groundwater above 10 ppm PCBs would be excavated, treated with a dechlorination agent to reduce the toxicity of contaminants, placed back on site, and contained under a cap. The dechlorination solution and tank liquids would be disposed of offsite. Depending on the final concentration of PCBs in the treated soils, long-term monitoring and deed restrictions may be required.

Alternative 7: ***Disposal of contaminated soils at a permitted hazardous waste landfill, containment of low level contamination under a soil cover.***

Capital Cost	$3,800,000
O&M	$0
Present Worth	$3,800,000

Under this option, contaminated soils above 10 ppm PCBs would be excavated and disposed of at a permitted hazardous waste landfill. The soils would be transported by a licensed hauler and processed as required by the disposal facility. Soils containing PCBs below 10 ppm would be capped in place. Removal of approximately 18,000 tons of contaminated soil would require about 600 truck/trailer trips from the site.

Alternative 8: ***Onsite stabilization of contaminated soils and perched groundwater, capping of stabilized soils, low level contamination and demolition debris, surface water controls, and groundwater monitoring.***

Capital Costs	$2,200,000
O&M	$28,680
Present Worth	$2,600,000

The contaminated soils and perched groundwater with PCB concentrations greater than 10 ppm would be excavated and treated with stabilization agents such as lime, fly ash or portland cement to immobilize contaminants. Stabilized soils and demolition debris would be contained on site with surface water controls and a multi-layer cap. Long-term groundwater monitoring and deed restrictions would be required.

Alternative 9: ***In-situ vitrification of contaminated soils, capping of soils with low level contamination and demolition debris.***

Capital Costs	$6,700,000
O&M	$0
Present Worth	$6,700,000


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In-situ vitrification is a process in which the contaminated soils would be melted into a solidified glass-like mass and left on site under a soil cover. The PCBs would be destroyed by the process and the metal contaminants immobilized. The soil cover would also contain soils with PCB contamination from 1 ppm to 10 ppm.

The Proposed Plan:

Identify the preferred alternative.

EPA and the Washington Department of Ecology prefer the following actions for cleaning up contaminated soils and liquids at the Coal Creek site:

- removing asbestos from the onsite building and disposing of it in a permitted landfill.
- demolition of site structures and disposal of debris in an approved landfill or incinerate onsite.
- excavation and onsite incineration of soils and sediments with PCB concentrations greater than 50 ppm.
- placement of incinerator ash and remaining soil and debris containing from 1 to 50 ppm PCBs in an excavation that is above the highest seasonal groundwater table and beyond the 100-year flood plain. These materials would be contained under an engineered cap.
- incineration or offsite disposal of perched groundwater in the fill mound.
- incineration of container liquids and sludges onsite.
- construction of diversion trenches to control run-on/runoff of surface waters onto the final site cover.
- deed restrictions on land and groundwater use to protect the integrity of the cleanup remedy.
- monitoring of groundwater for 5 years including annual sampling and analysis for site contaminants and quarterly monitoring of groundwater elevations.

Implementation of the proposed plan may require some preliminary actions to lower the groundwater table and/or dewater portions of the fill mound. In addition, rigorous sampling will be required to properly designate the quantity of soil and debris to be incinerated. Extensive materials handling is likely to be required to remove large objects and control the quality of the feed.

Table 1
Glossary of Evaluation Criteria

EPA ranks the alternatives considered against the following nine evaluation criteria:

Introduce the nine NCP criteria.

Overall protection of human health and the environment - addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls.

Compliance with federal and state environmental standards - addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

Long-term effectiveness and permanence - refers to the magnitude of remaining risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

Reduction of toxicity, mobility, and volume - is the anticipated performance of the treatment technologies that may be employed in a remedy.

Short-term effectiveness - refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

Implementability - is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost - includes capital and operation and maintenance (O&M) costs.

State acceptance - indicates whether the State concurs with, opposes, or has no comment on the preferred alternative.

Community acceptance - will be assessed following a review of the public comments received on the RI/FS report and the Proposed Plan.

EPA will ensure, based on testing, that the incinerator is operating properly. If it is determined that the unit cannot be operated safely, EPA will propose another cleanup remedy evaluated in the Feasibility Study.

EPA believes the preceding cleanup actions would best balance the criteria that EPA uses to evaluate alternatives. The following section profiles the performance of the preferred alternative against the criteria and discusses how it compares to other final alternatives. Table 1 is a glossary of the evaluation criteria.

Analysis of Alternatives:

The alternatives outlined above were evaluated based on the criteria defined in the Table 1 glossary of evaluation criteria.

Introduce the nine NCP criteria.

The following is a discussion of that evaluation.

Protectiveness of Human Health and the Environment. The preferred alternative is protective because it employs treatment to eliminate the principal threats associated with PCB contamination, removes contaminants from the 100-year flood plain, and reduces the likelihood of ground or surface waters or nearby populations coming into contact with remaining low level contamination. The preferred alternative would significantly reduce the site associated risk to between one in ten thousand and one in one hundred thousand.

Provide rationale for the preferred alternative, profiling it against the criteria and comparing with other alternatives.

Containment alone without treatment is only partially protective because of the possibility that groundwater may rise into or flood waters may inundate areas of the fill mound carrying contaminants into the wetlands or Coal Creek. Onsite incineration of contaminated soils, in-situ vitrification, offsite disposal to a chemically secure landfill, solvent extraction to remove PCBs and chemical treatment to detoxify PCBs would all be fully protective of human health and the environment because these options destroy or remove the principal contaminants found at the site thus eliminating potential exposures. Onsite stabilization would only be fully protective if combined with containment technologies to prevent contact between residual soil contaminants and ground and surface waters.

Compliance with ARARs. The preferred alternative (incineration/ containment) and alternatives 4 and 7 can meet all identified, applicable or relevant and appropriate requirements (ARARs) without reservation. These requirements are outlined in detail in the RI report.

The other alternatives currently do not comply with ARARs because certain chemical-specific and location-specific regulations need to be met. Alternatives 2, 3 and 8 would require a waiver from the Toxic Substances Control Act (TSCA) Chemical Waste Landfill requirements because depth to groundwater and leachate collection requirements could not be met. Alternatives 5, 6, and 9 would comply only if a level of performance equivalent to incineration could be demonstrated.

Identify the major ARARs associated with the alternatives.


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Although the preferred alternative would involve the excavation and placement of waste, thus making the Land Disposal Restrictions (LDR) potential ARARs, PCB contaminated soil at this site is not a Resource Conservation and Recovery Act (RCRA hazardous waste and therefore these requirements are not applicable.

Long-Term Effectiveness and Permanence. Alternatives 4, 5, 6, 7, and 9 are effective over the long term because they destroy or remove contaminants, thereby permanently eliminating the potential for exposure. Stabilization would reduce the mobility of some contaminants, but may not effectively immobilize high concentrations of organic contaminants. Containment alone may result in some contaminant migration by rising groundwater or flooding.

The preferred alternative would leave low levels of PCB contamination on site contained under an engineered cap. This cap would be comprised of a synthetic membrane or 2 feet of compacted clay soil to reduce the likelihood of rainwaters flowing through the mound and coming into contact with remaining contamination. A foot of soil would be placed on top of the cap to provide for revegetation. The cap and soil cover would be graded to a 5 percent slope to control the runoff of surface waters. The long term effectiveness of this approach is expected to be good, based on the relative immobility of PCBs in soil and water as confirmed by modeling and past monitoring data.

Reduction of Toxicity, Mobility, and Volume Through Treatment. The preferred alternative involves both treatment and containment of the contaminated soils to reduce contaminant volume, mobility and toxicity. The containment options alone do not directly reduce the toxicity, volume, or mobility of contaminated soils. In-situ vitrification and incineration destroy the PCBs through thermal destruction. Dechlorination reduces the toxicity of PCBs by chemical change to less toxic or non-toxic compounds. Solvent extraction reduces the volume of contaminated soils. Stabilization alone would reduce the mobility of site contaminants but would result in an increase in the volume of contaminated material. Removal of contaminated soils to an offsite landfill does not satisfy this criteria.

Short-Term Effectiveness. Onsite containment and in-situ vitrification have the lowest short-term risk because contaminated soils would be least disturbed by these alternatives. Offsite disposal and onsite treatment technologies requiring excavation would result in some air emissions requiring control measures. The preferred alternative as well as all alternatives except onsite containment and in-situ vitrification would involve extensive excavation of contaminated soils and would result in some potential for air emissions and potentially additional short-term risk.


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Implementability. All of the alternatives can be implemented with varying degrees of difficulty. Incineration, stabilization, solvent extraction, chemical treatment and offsite disposal would require extensive materials handling. The easiest alternative to implement is containment of contaminated soils on site under a cap. In-situ vitrification may require dewatering of the fill mound prior to treatment. The preferred alternative ranks as intermediate with respect to implementability since it employs both treatment and containment features.

Cost. The estimated costs for each evaluated alternative are listed below beginning with the least expensive moving down to the most expensive:

- **Alternative 2**

Capital Cost	$600,000
O&M (annual)	$44,800
Present Worth	$1,300,000

- **Alternative 3**

Capital Cost	$690,000
O&M	$50,700
Present Worth	$1,500,000

- **Alternative 8**

Capital Cost	$2,200,000
O&M	$26,680
Present Worth	$2,600,000

- **Alternative 7**

Capital Cost	$3,800,000
O&M	$0
Present Worth	$3,800,000

- **Preferred Alternative**

Capital Cost	$3,800,000
O&M	$50,000
Present Worth	$3,850,000

- **Alternative 5**

Capital Cost	$4,140,000
O&M	$0
Present Worth	$4,140,000


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- **Alternative 4**

Capital Cost	$6,300,000
O&M	$0
Present Worth	$6,300,000

- **Alternative 9**

Capital Cost	$6,700,000
O&M	$0
Present Worth	$6,700,000

- **Alternative 6**

Capital Cost	$7,500,000
O&M	$0
Present Worth	$7,500,000

State Acceptance. The Washington Department of Ecology has concurred that the preferred alternative is acceptable.

State and support agency acceptance.

Community Acceptance. This will be evaluated based upon comments received during the public comment period. Based on new information presented during public comment, EPA may modify the preferred alternative or select another response action included in this plan and the RI/FS report. The public is encouraged to review and comment on all of the alternatives identified in the Feasibility Study.

Upcoming Activities

EPA will respond to all comments submitted during the comment period in a document called a "Responsiveness Summary." After considering all comments, EPA will make its final decision on the cleanup remedy for the Coal Creek site, which will be outlined in a decision document called a Record of Decision (ROD). The Responsiveness Summary will be an attachment to the ROD, which will be available for review at the Chehalis-Timberland Library. Once the ROD is signed by EPA, the agency will enter into negotiations with the potentially responsible parties to implement the cleanup outlined in the ROD.

For More Information Contact:

In Seattle:

Bill Glaser, Project Manager
(206) 442-7215

Michelle Pirzadeh, Community Relations Coordinator
(206) 442-1272


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In Olympia:

Bob Kievit, EPA Washington Operations Office
(206) 753-9014


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Note C. Example Notice of Availability.

THE UNITED STATES
DEPARTMENT OF ENERGY
Invites
PUBLIC COMMENT ON THE
PROPOSED CLEANUP OF OPERABLE UNIT 10
at
DOE FACILITY, CITY, STATE

The U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the State will hold a **Public Meeting** to discuss the Remedial Investigation/Feasibility Study (RI/FS) Report and the Proposed Plan for Operable Unit 10 at the DOE Facility. The meeting will be held on February 15, 1993 at 7:30 p.m. in the Community Hall, 222 Elm Street, City, State.

DOE (the lead agency), EPA, and the Sate (the support agencies) evaluated the following options for addressing the contaminated soil at the DOE Facility, Operable Unit 10:

- Capping the contaminated soils
- Excavation and disposal in an offsite landfill
- Excavation, treatment of organics (in a vaporization loop), stabilization of residual metals, and disposal in an onsite landfill
- Excavation and offsite incineration
- Excavation, onsite incineration of soil (for organics), and stabilization of residual metals
- No action

Based on available information, the preferred option at this time is to excavate the 7,500 cubic yards of contaminated soil at the site, treat the volatile organics in a vaporization loop, stabilize the soils to immobilize metal contaminants, and dispose of them in an onsite landfill.

Although this is the preferred alternative at the present time, DOE and the support agencies welcome the public's comments on all alternatives identified above. DOE and the support agencies will choose the final remedy after the public comment period ends and may select any one of the options after taking those comments into account.

The Proposed Plan has been mailed to all known interested parties. Also, complete documentation of the analysis is presented in the RI/FS Report and in the Proposed Plan, which are available with the rest of the Administrative Record file at the City Public Library, 333 Elm Street.

The public may comment at the public meeting and/or may submit written comments today and until March 1, 1993 to Jonathan Doe at the DOE address below. For further information, contact:


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Jonathan Doe
Community Relations Coordinator
U.S. Department of Energy
321 Peabody Lane
City, State 00000
(555) 555-9193

Toll Free (800) 999-9999 between 8:00 a.m. and 5:00 p.m. Monday through Friday


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Note D. **Contents of Administrative Record.** The following has been adapted from *Administrative Records Fact Sheet* (EPA, 1988).

Administrative Records for Federal Facilities

Background

Section 113(k) of CERCLA requires the establishment of Administrative Records for selection of CERCLA response actions. The Administrative Record should consist of documents which the Agency considered or relied on to select the response action and documents which demonstrate the public's opportunity to participate in the selection of the response action.

Section 113(k) (2) (B) of CERCLA requires that EPA promulgate regulations establishing procedures for the participation of interested persons in the development of the record. Section 113(k) (2) (C) provides that until such regulations are promulgated, the Administrative Record should be established according to "current procedures."

Executive Order 12580 authorizes Federal agencies to establish the Administrative Record for selection of response actions for Federal facilities under their jurisdiction, custody, or control. Federal agencies must compile and maintain records as required by the regulations, as finally promulgated.

General Responsibilities

- DOE must compile and maintain the Administrative Record file (i.e., the incomplete record as it is being compiled).
- The record file should consist of:
    1. documents which the lead agency considered or relied on to select the response action; and
    2. documents which demonstrate the public's opportunity to participate in and comment on the selection of the response action.
- The record file must be established at a central location (Federal agency regional office) and made available for public inspection at or near the site.
- When EPA is involved in the selection of the response action at a Federal facility, the lead agency must provide EPA with a copy of the index to the record file, the RI/FS workplan, the RI/FS released for public comment, the Proposed Plan, any public comments received on the RI/FS and Proposed Plan, and any other documents requested by EPA.
- EPA may require the lead agency to place additional documentation in the record file.


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- The lead agency may add documents to the record file after the decision document selecting the response action has been signed in the following cases:

  1. the documents concern a portion of a response action decision that the decision document does not address;

  2. the documents concern a portion of a response action decision that the decision document reserves to be decided at a later date;

  3. an explanation of significant differences is issued under section 117(c) of CERCLA (place the explanation of significant differences and all underlying documents in the record file); or

  4. the decision document is amended (place the amended decision document and all underlying documents in the record file).

- Documents received after the close of the public comment period should be placed in the record file only if:

  1. they contain significant information not contained elsewhere in the record file;

  2. which could not have been submitted during the public comment period; and

  3. which substantially support the need to significantly alter the response action.

- The responsibilities and procedures for establishing the record should be specified in the Inter-Agency Agreement (IAG).

Remedial Response Actions

- The Administrative Record file must be available for public inspection when the remedial investigation phase begins.
- A notice of availability of the record file must be published in a major local newspaper.
- A public comment period of at least 30 days is required on the RI/FS, Proposed Plan, and record file.

Removal Response Actions

- For purposes of the Administrative Record, removal response actions are divided into three categories:

  1. Non-time critical removal actions

     - Planning period of <u>at least</u> 6 months from the site evaluation before beginning on-site cleanup activity.


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- The record file must be available for public inspection when the Engineering Evaluation/Cost Analysis (EE/CA) or its equivalent is made available for public comment.
- A notice of the availability of the record file must be published in a major local newspaper.
- A public comment period of at least 30 days is required on the EE/CA and the record file.

2. Time critical removal actions

- Planning period of <u>less than</u> 6 months from the site evaluation before beginning on-site cleanup activity.
- The record file must be available for public inspection no later than 60 days after initiation of on-site removal activity.
- A notice of the availability of the record file must be published in a major local newspaper.
- Where appropriate, a public comment period of at least 30 days is required from the time the record file is available for public inspection.

3. Emergency removal actions

- On-site cleanup begins within hours of the determination that a removal is appropriate and ends within 30 days.
- Procedures are the same as for time critical removals except that the record file must be established at a central location but does not have to be made available for public inspection at or near the site.

Contents of the Administrative Record File

- The record file for a response action will typically, but not in all cases, include the following documents:

<u>Factual Information/Data</u>

Sampling Plan
Validated sampling and analysis data
Data summary sheets
Chain of custody forms
Project plan or program plan (QAPP) **[Remedial]**
Preliminary assessment report
Site investigation report
Inspection reports
RI/FS final workplan **[Remedial]**


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Amendments to final RI/FS workplan **[Remedial]**
Summary of remedial action alternatives (used in conjunction with early special notice letters) **[Remedial]**
RI/FS **[Remedial]**
Engineering evaluation/Cost analysis (EE/CA) **[Removal]**
Technical studies
Factual information submitted by the public (including PRPs)
Documentation supporting determination of imminent and substantial endangerment

Policy and Guidance

Memoranda on policy decisions (site-specific, issue-specific)
Guidance documents
Technical literature

Public Participation

Correspondence
Public notices
Public comments
Community relations plan
Notice Letters to PRPs
Proposed Plan **[Remedial]**
Transcript of meeting on RI/FS and Proposed Plan **[Remedial]**
Transcript of meeting on waivers under section 121(d) of CERCLA **[Remedial]**
Documentation of other public meetings
Response to significant comments

Other Party Information

ATSDR health assessment
Natural Resources Trustees finding of fact and final reports
Documentation of State involvement

Decision Documents

Record of Decision, including responsiveness summary **[Remedial]**
EE/CA approval memorandum **[Removal]**
Action Memorandum **[Removal]**

Enforcement Documents

Administrative orders
Consent decrees


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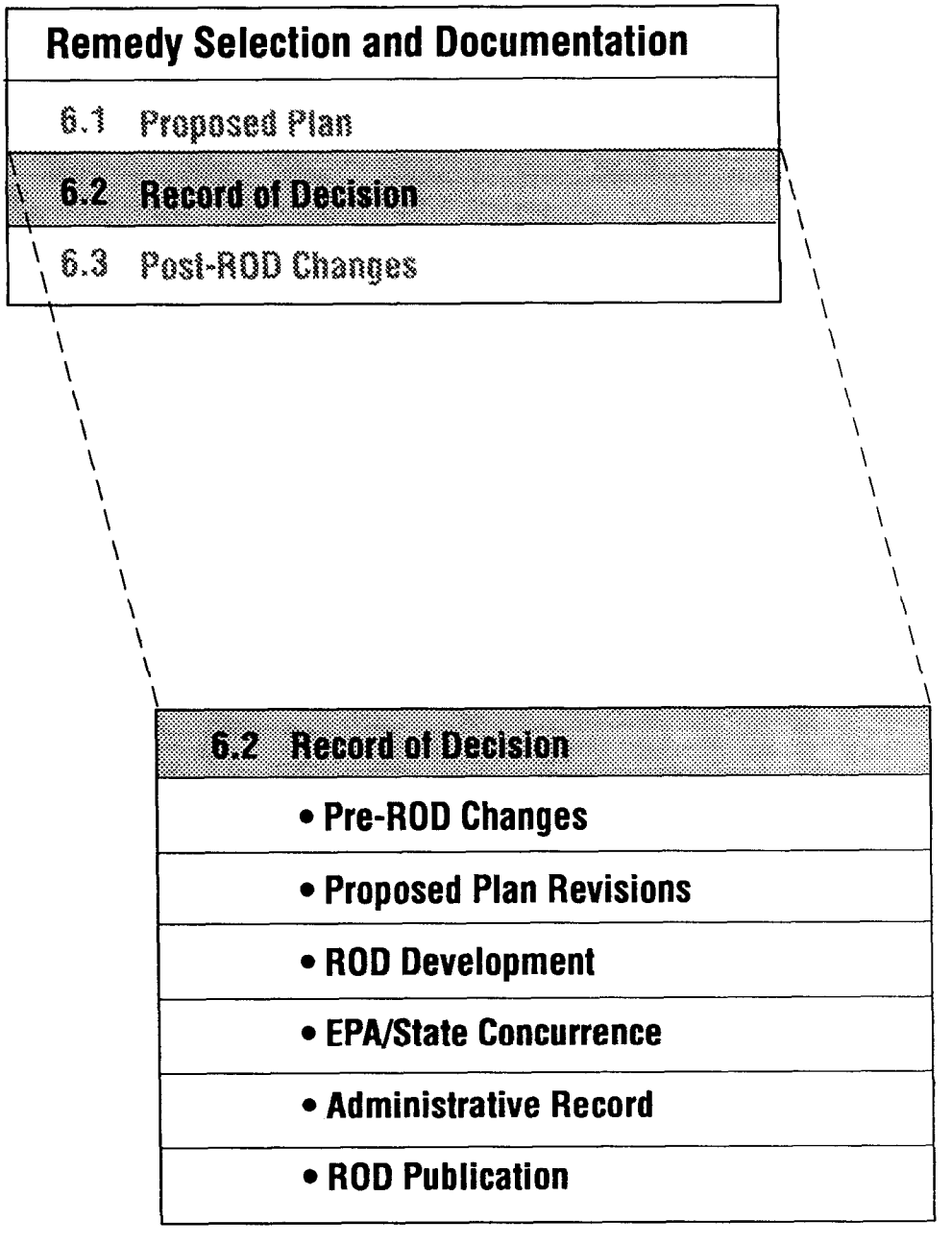
Affidavits
Response to notice letters containing relevant factual info

Index to the Record File

Submodule 6.2 Record of Decision



Submodule 6.2 Record of Decision

Purpose

To provide guidance on remedy selection, and on preparing and publishing the ROD.

Background

The ROD is a legally binding document that selects the remedy and sets the bounds for RD and RA. As lead agency, DOE will be responsible for preparing the ROD. EPA and the State retain responsibility for signing the ROD. Site-specific compliance agreements may contain specific agreements about DOE and regulatory agency responsibility in development and approval of the ROD.

The ROD is a highly structured document. The EPA ROD guidance (1988) gives very detailed information on organization, contents, and language for the ROD, and should be consulted in the actual drafting of the ROD.

A DOE project manager should know the following about RODs:

- RODs are not exhaustive documents; they are typically quite brief (generally ranging from 10 to 40 pages), considering the amount of work and information they summarize. The ROD relies on the RI report, the FS report, and the baseline risk assessment (part of the RI report) to provide details on the matters it summarizes.

- There are four kinds of RODs: (1) No-Action, (2) Interim Action, (3) Contingent Action, and (4) Final. They are differentiated by structure and content (see Submodule 6.2, Note E). The EPA ROD guidance (1988) gives detailed information for developing each of the four types.

- Frequently, the remedy selected in the ROD differs from the preferred alternative as presented in the Proposed Plan. Such differences are referred to as pre-ROD changes. The three types of pre-ROD changes are as follows:

  - Minor changes (differences briefly noted in the ROD).

  - Significant changes that are a logical extension of the information available to the public in the Proposed Plan and the RI/FS report. If the public could have reasonably anticipated the change, based on public information, then it is a logical extension that requires a discussion in the Decision Summary section of the ROD.

  - Significant changes may sometimes result that are not logical extensions of the Proposed Plan and its supporting information. These require a revised Proposed Plan and opportunity for public comment prior to completing a ROD.[1]

- Maintaining flexibility in the description of the selected remedy remains a key consideration in developing a ROD that is adaptable to streamlining efforts during RD/RA. The selected remedy should be described in broad terms, using technologies and families of process options rather than specific and restrictive formulations that may

[1]The pre-ROD change categories are similar to post-ROD change categories "Minor, Significant, and Fundamental." See NCP 400 CFR 400.435 and Submodule 6.3 for additional information.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necessitate ROD amendments when deviations are later encountered. Specific attention should be given to identifying reasonable deviations and the need for contingency plans.

Organization

Submodule 6.2 discusses the following:

- Pre-ROD Changes
- Proposed Plan Revisions
- ROD Development
- EPA/State Concurrence
- Administrative Record
- ROD Publication

In addition, more detailed information is provided in the following notes:

- Note A–Outline for ROD
- Note B–Suggested Wording for Declaration and Decision Summary Sections in a ROD
- Note C–Responsiveness Summary
- Note D–No-Action, Interim Action, Contingent Action, and Final RODs
- Note E–Example ROD

Sources

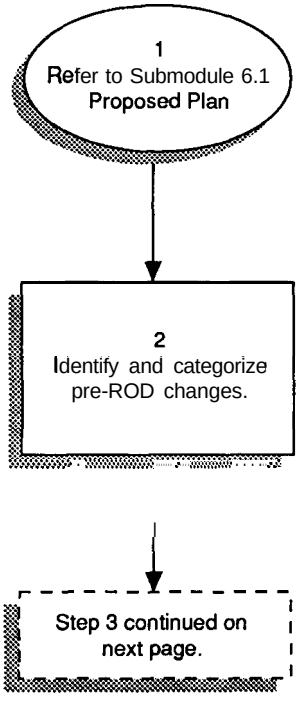
1. U.S. DOE, November 1991, *Guidance on Public Participation for U.S. Department of Energy Environmental Restoration Activities*, DOE/EH-0221.

2. U.S. EPA, 1988, *Guidance on Preparing Superfund Decision Documents: The Proposed Plan and Record of Decision, Explanation of Significant Differences, and The Record of Decision Amendment*, Interim Final, OSWER Directive 9355.3-02.

3. U.S. EPA, April 1990, *Guide to Selecting Superfund Remedial Actions*, OSWER Directive 9355.0-27FS.

4. U.S. EPA, May 1990, *Guide to Developing Proposed Plans*, OSWER Directive 9335.2-02FS-2.

Submodule 6.2 Record of Decision



Step 1. Refer to Submodule 6.1, Proposed Plan.

Step 2. **Identify and categorize pre-ROD changes.** After publication of the Proposed Plan, new information or comments from the public or support agencies that require changes to the preferred alternative may become available before development of the ROD.

Minor changes to the preferred alternative that have little effect on overall scope, performance, or cost can be documented by noting them in the Description of Alternatives section of the ROD.

Significant changes alter the basic features of the remedy with regard to scope, performance, or cost as described in the original Proposed Plan and the supporting analysis and information. There are two kinds of pre-ROD significant changes. The first kind of significant change is one that could be reasonably anticipated by the public (on the basis of alternatives and other information available in the Proposed Plan or the supporting analysis and information in the Administrative Record). They are considered logical extensions of the information available to the public. These significant changes are addressed by discussion in the Decision Summary section of the ROD, describing the significant changes and reasons for such changes. Some instances where changes are likely to be classified as logical extensions of the information available for public comment are as follows:

- A component of the selected remedy is changed.
- A remedy other than the one identified as the preferred alternative may be selected, as long as both were discussed in the FS and Proposed Plan.
- The components of two or more alternatives may be combined.

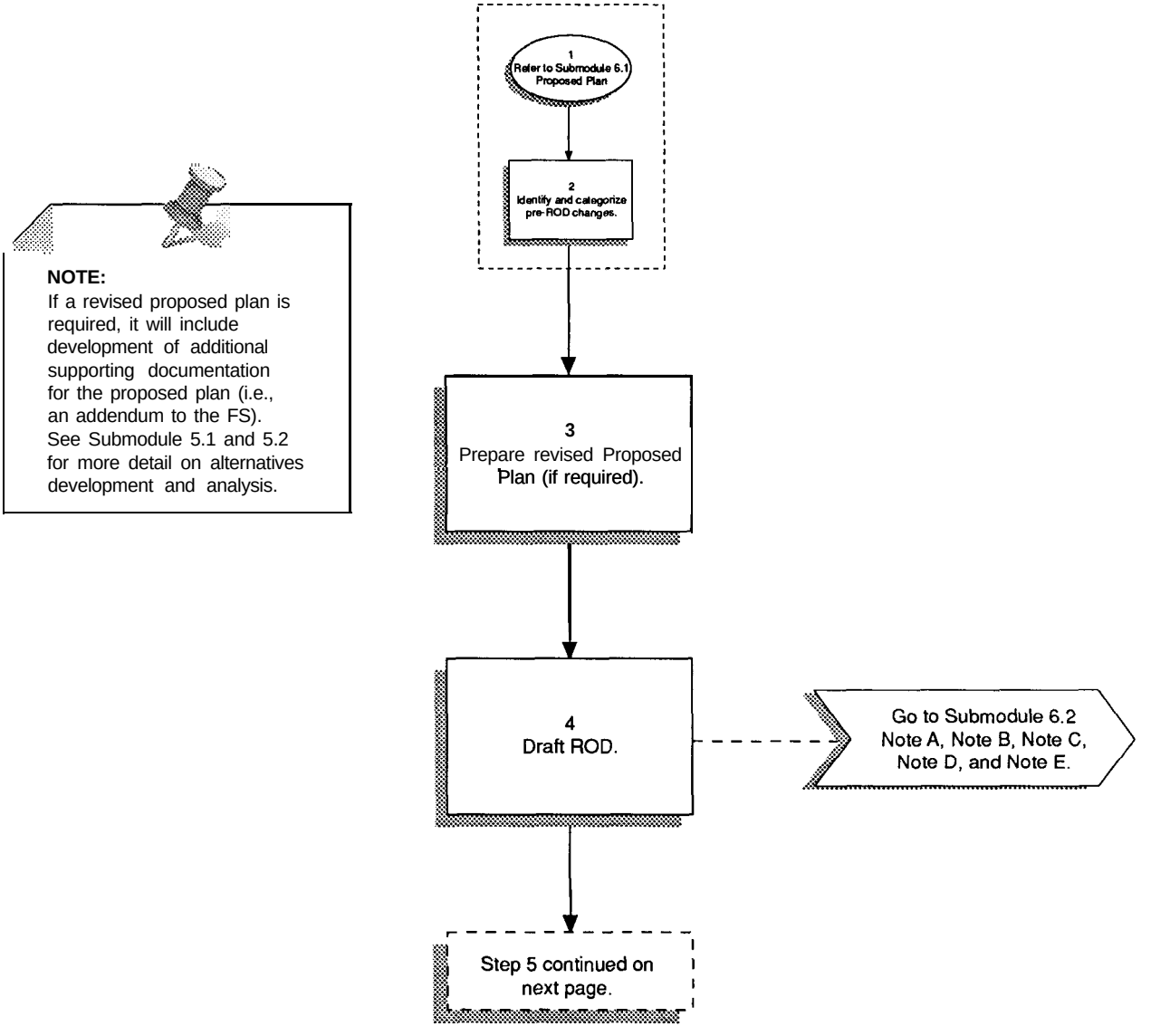
The second kind of significant change is one that could not have been reasonably anticipated by the public (on the basis of the information available in the Proposed Plan, or the supporting analysis and information in the Administrative Record). In such instances, it is appropriate to prepare and seek additional public comment on a revised Proposed Plan before selecting a remedy and developing the ROD. For these changes, DOE must issue a revised Proposed Plan that includes a discussion of the changes and reasons for such changes, in accordance with the public participation requirements.

Two situations where significant changes would require a revised Proposed Plan and additional opportunity for public comment are as follows:

- A new alternative that was not previously analyzed in the FS is selected by DOE on the basis of new information or public comments.
- A change to a component of the selected alternative that radically alters the overall remedy with regard to scope, performance, or cost in a manner that the public could not have reasonably anticipated.

The EPA ROD guidance provides further information and criteria for identifying minor and significant pre-ROD changes.

Submodule 6.2 Record of Decision (cont.)



Step 3. **Prepare revised Proposed Plan (if required).** The revised Proposed Plan (if required) is developed from the original Proposed Plan, clearly delineating the significant changes and noting the opportunity for additional public comment. The requirements for developing the revised Proposed Plan and facilitating public input are the same as for the original Proposed Plan. In addition, it will be necessary to develop supporting documentation for this alternative. This is best accomplished by preparing an addendum to the FS that includes detailed development of the alternative (see Submodule 5.1) and revised detailed analysis (see Submodule 5.2).

Step 4. **Draft ROD.** The ROD has four main roles: (1) to serve a legal function by documenting that the remedy selection process was carried out in accordance with the integrated requirements of CERCLA and the NCP; (2) to be informational by providing the public with a consolidated source of history, characteristics, and risks posed by the conditions at the site, as well as a summary of the cleanup alternatives, their evaluation, and the rationale behind the selected remedy; (3) to include the responsiveness summary to public comments; and (4) to outline the engineering components and remediation goals of the selected remedy. An example ROD outline is presented in Submodule 6.2, Note A.

The ROD is required to consist of three basic elements:

- A **Declaration** that functions as an abstract of the key information contained in the ROD and is the section of the ROD signed by the EPA Regional Administrator or Assistant Administrator and the authorized DOE Field Office manager. Submodule 6.2, Note B, provides an example of suggested wording for the Declaration.

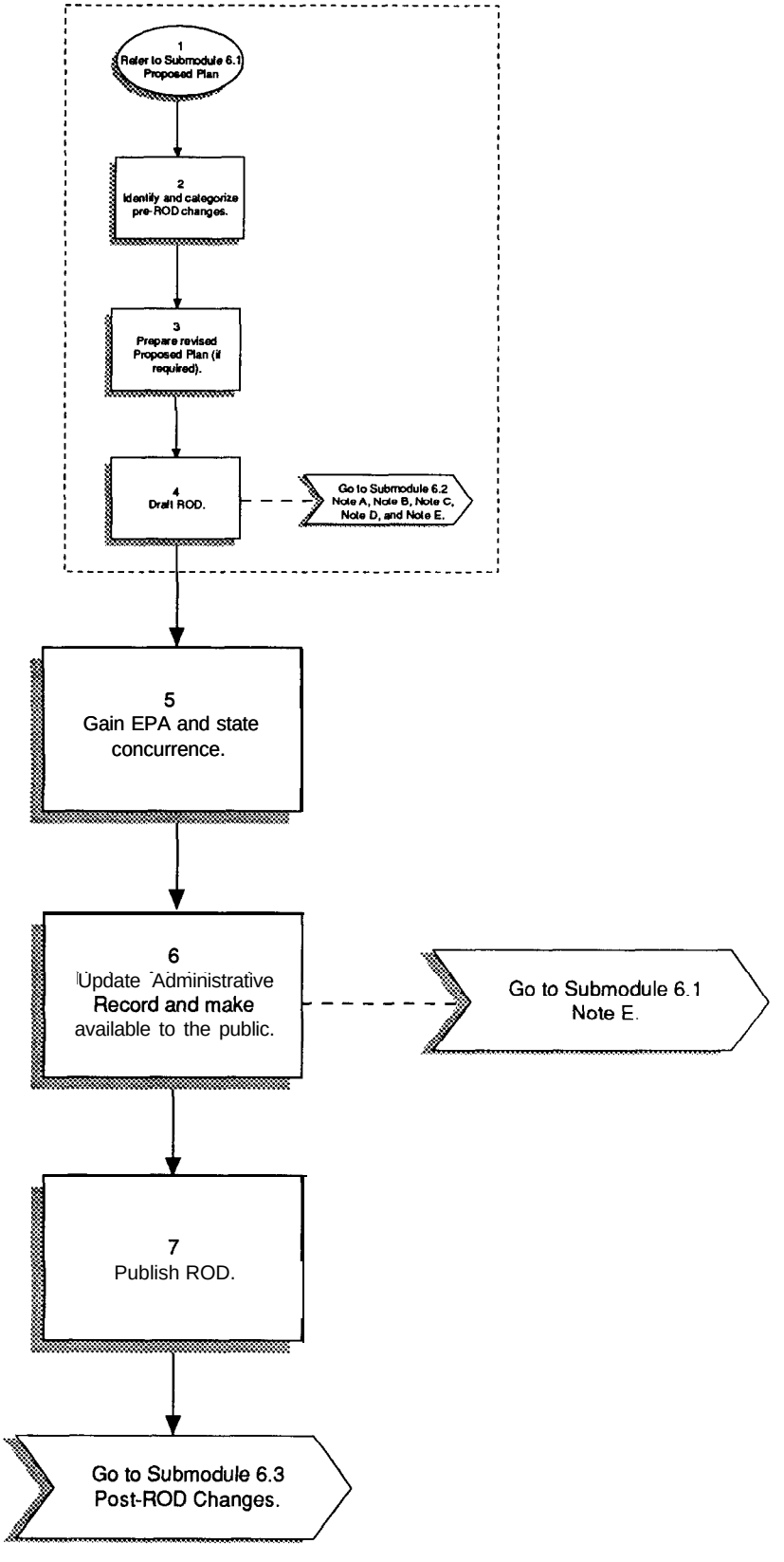
- The **Decision Summary,** which provides formal acceptance of the RI/FS approach and results, including the site model as a basis for remedy selection, risk assessment, ARARs evaluation, and alternatives development and evaluation. The Decision Summary also identifies the selected remedy and explains how the remedy fulfills statutory requirements and CERCLA expectations. Submodule 6.2, Note B, also provides an example of suggested wording for the Decision Summary.

- A **Responsiveness Summary** that addresses the public comments received on the Proposed Plan, RI/FS report, and other information in the Administrative Record. This can be prepared as a separate document. See Submodule 6.2, Note C, for additional information.

Four types of RODs correspond to different types of remedial action: (1) No-Action, (2) Interim Action, (3) Contingent Action, and (4) Final Action. See Submodule 6.2, Note D, for details on the information required for each.

The ROD example (see Submodule 6.2, Note E) is an interim action ROD for an OU remedial action for the Weldon Spring Site. This particular example provides a good understanding of the components of the ROD, but is somewhat streamlined compared with a final cleanup decision.

Submodule 6.2 Record of Decision (cont.)



Step 5. **Gain EPA and State concurrence.** The DOE project manager is responsible for obtaining EPA and State concurrence in the selected remedy. EPA will have to sign the ROD; EPA concurrence is, therefore, essential. The compliance agreement may specify that the State also sign the ROD. A goal of 15 working days for support agency review is suggested in the EPA ROD guidance. Schedules for specific compliance agreements may involve different time frames.

Step 6. **Update Administrative Record and make available to the public.** The Administrative Record was initiated during scoping and should have been kept current throughout the process. It was brought to a high level of completeness and organization when the FS and Proposed Plan were released. At this point, it should only be necessary to add public comments, transcripts of public meetings, and the final ROD to ensure that the Administrative Record is complete. This is necessary in the event of any challenges to the selected remedy. Any court review would be based primarily on the Administrative Record. Submodule 6.1, Note E, provides additional detail on requirements of the Administrative Record.

Even at this point, the Administrative Record is not final. Additional information will be added throughout the RD/RA process.

Step 7. **Publish ROD.** A newspaper release is required to denote the signing of the ROD. The five required elements of the notice are as follows:

- Site name and notice of availability of the ROD
- Date on which the ROD was signed
- Brief summary of the major elements of the selected remedy
- Details about the hours of availability of the Administrative Record and/or the information repository
- Name and telephone number of individual(s) to contact for further information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Note A. Outline for a ROD.

Outline for the Standard Record of Decision

Declaration

- Site Name and Location
- Statement of Basis and Purpose
- Assessment of the Site
- Description of the Selected Remedy
- Statutory Determinations
- Signature and Support Agency Acceptance of the Remedy

Decision Summary

- Site Name, Location, and Description
- Site History and Enforcement Activities
- Highlights of Community Participation
- Scope and Role of Operable Unit
- Site Characteristics
- Summary of Site Risks (Human Health and Ecological)
- Description of Alternatives
- Summary of Comparative Analysis of Alternatives
- Selected Remedy
- Statutory Determinations
- Documentation of Significant Changes

Responsiveness Summary

- Community Preferences
- Integration of Comments


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Note B. Suggested Wording for Declaration and Decision Summary Sections in a ROD.

The following paragraphs provide example language for handling various topics in the ROD. The discussions are quite brief, even for fairly complex matters. Supporting documentation of the details is provided by the RI (including the risk assessment) and the FS.

Declaration

Example language for the statement of basis and purpose in the declaration

> The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the principal threats of the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The size of the landfill and the fact that no onsite hot spots exist that represent the major sources of contamination preclude a remedy for effective excavation and treatment of contaminants.
>
> Because this remedy will result in hazardous substances remaining onsite and above health-based levels, a review will be conducted within 5 years after commencement of RA to ensure that the remedy continues to provide adequate protection of human health and the environment.

Required language for assessment of the site

> Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

Decision Summary

Example language for community participation activities

> The RI/FS and Proposed Plan for the "DOE Site" were released to the public in August 1991. These two documents were made available to the public in both the Administrative Record and in an information repository maintained at the "Public Reading Room" at the DOE Operations Office and at the Nameless Public Library. The notice of availability for these two documents was published in the *Nameless Advocate* on August 28, 1991. A public comment period was held from October 3, 1991, through November 5, 1991. In addition, a public meeting was held on October 17, 1991, wherein representatives from DOE and the State Pollution Control Board answered questions about problems at the site and the remedial alternatives under consideration. Thirty-two comments were received on the Proposed Plan. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document presents the selected remedial action for the "DOE Site," in Nameless, State, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the Administrative Record.


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Example language for scope and role of operable unit section

As with many Superfund sites, the problems at the "DOE Site" are complex. As a result, DOE organized the work into three OUs. These are as follows:

- OU 1–Contamination in the drinking water
- OU 2–Contamination of three groundwater aquifers
- OU 3–Contamination in the soils

EPA has already selected remedies for OUs 1 and 2. Both of these actions are in the RD stage. Actual construction is planned to begin in March 1994.

The third OU authorized by this ROD addresses the contaminated soils in the tank farm area. This area of the site poses the principal threat to human health and the environment because of the risks from possible ingestion or dermal contact with the soils. Also, migration of contaminant(s) of potential concern from the soil into the underlying groundwater poses a threat to the source of drinking water. The purpose of this response is to prevent current or future exposure to the contaminated soils and to reduce contaminant(s) of potential concern migration into the groundwater. This third OU will be the final response action for this site.

Example language for toxicity assessment summary

Slope factors (SFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminant(s) of potential concern. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an "upper bound" estimate of the excess lifetime cancer risk associated with exposure at that intake level. The phrase "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach renders underestimation of the actual cancer risk highly unlikely. SFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to contaminant(s) of potential concern that exhibit noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of contaminant(s) of potential concern from environmental media [e.g., the amount of a contaminant(s) of potential concern ingested from contaminated drinking water] can be compared with the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Example language for risk characterization summary

Excess lifetime cancer risks are determined by multiplying the intake level by the SF. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6} or 1E-6). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound,


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an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant(s) of potential concern in a single medium is expressed as the hazard quotient (HQ) or the ratio of the estimated intake derived from the contaminant(s) of potential concern concentration in a given medium to the contaminant(s) of potential concern RfD. The hazard index (HI) can be generated by adding the HQs for all contaminant(s) of potential concern within a medium or across all media to which a given population may reasonably be exposed. The HI provides a useful reference point for gauging the potential significance of multiple contaminant(s) of potential concern exposures within a single medium or across media.

Example language for summary of site risks

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

Examples of Federal and State ARARs descriptions and the potential for the selected remedy to achieve ARARs

RCRA Land Disposal Restrictions in 40 CFR 268 are applicable and will be achieved by using BDAT (rotary kiln incineration and stabilization), which is specified in the requirements for nonwastewaters containing K001 waste. Treatment levels specified for the constituents pyrene and toluene will be achieved.

CWA requirement for Best Available Technology will be achieved using hydroxide precipitation and sedimentation for treatment of metal waste. Discharge limits will be established using best professional judgment during remedial design.

Example language for explaining waivers from ARARs

ARARs waivers are developed pursuant to the NCP, 40 CFR 300.430 (f)(1)(ii)(C). ARARs waivers are initially developed during the FS and must be documented in both the Proposed Plan and the ROD. Five general conditions allow DOE to invoke waivers. The following (taken from actual RODs) provides example language for the documentation of the five types of waivers.

- Interim Action. Remedial action alternatives for the catch basin are not intended as final remedial actions for the site. ARARs are waived [CERCLA Section 121(d)(4)(A)] for this portion because it is only part of a total remedial action alternative to be developed in an upcoming operable unit.

- Interim Remedy (Possible). The only component of the remedy that may not achieve all of the requirements is the onsite discharge of treated water, which is a back-up remedy. If this component does not meet the requirements, DOE will invoke a waiver on the basis that this is an interim remedy and that future (final) remedies would address the problem.


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- Greater Risk. Compliance will result in a greater risk to human health and the environment than alternative options. To achieve a side slope that does not exceed a 33 percent grade for the waste piles would mean cutting into the asbestos calcium/ magnesium carbonate contaminants. Such action would pose a serious risk to human health and the environment because asbestos fibers would probably become airborne from the disruption.

- Greater Risk (Possible). If the emissions requirement for landfill gas destruction cannot practicably be achieved, DOE will invoke the waiver from the requirements on the basis that compliance with these requirements would cause more damage to human health and the environment (by preventing collection and destruction of landfill gas) than by waiving them.

- Technical Impracticability. Neither the preferred remedy component of in situ treatment nor known standard treatment methods (water treatment facility) will attain the applicable numerical limit for arsenic, cadmium, or lead. These applicable numerical limits (ARARs) cannot be met because of technical impracticability. Instead, attainable standards have been established.

- Technical Impracticability (Possible). If, in the implementation of the remedial action, DOE determines that air stripping cannot treat methylethyl ketone (MEK) to the level required by the ARARs, then hot air stripping and scale control methods will be used unless DOE determines that the technology to treat MEK is impracticable. DOE will waive compliance with the MEK ARARs pursuant to CERCLA Section 121 (d)(4), and set an alternative limit that is protective of human health and the environment.

- Equivalent Performance. In addition, the 200-foot buffer zone requirement (no disposal within 200 feet of the property line) is technically impracticable given the site dimensions and would provide no significant added protection given the presence of hazardous substances already in the ground near the property line. These circumstances allow for the selection of the chosen alternative pursuant to CERCLA Sections 121 (d)(4)(C) and (B) although it will not comply with the buffer zone requirements.

- Inconsistently Applied State Requirement. This remedial alternative offers the best combination of effectiveness, implementability, and cost efficiency and involves the use of what can be considered the most feasible remedy under CERCLA for this contaminant. This alternative meets all Federal ARARs and all but one inconsistently applied State-related ARARs (liner requirements for containment pond) for which a wavier is appropriate under Section 121(d)(4)(E) of CERCLA. The waiver is justified because the State has not consistently applied the standard in similar circumstances in other remedial actions within the State.

Example language for discussing the relevance of TBC (to be considered)

In implementing the selected remedy, DOE, EPA, and the State have agreed to consider a number of procedures that are not legally binding. These include the guidance on designing


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RCRA caps (*Draft RCRA Guidance Document, Landfill Design, Liner Systems and Final Cover*, issued June 1982) and posting a deed notice at the site after the remedial action has been completed. The guidance on designing RCRA caps includes specifications to be followed in constructing and maintaining a RCRA cap. Deed restrictions are institutional controls that will be enforced by the local government to ensure that the RCRA cap is not disturbed.

Example language for discussing pre-ROD changes in ROD

- No Significant Changes

  The Proposed Plan for the "DOE Site" was released for public comment in August 1991. The Proposed Plan identified Alternative 4, excavation and onsite volatilization of volatile organic compounds (VOCs), as the preferred alternative for soil and sediment remediation. DOE reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes were necessary to the remedy, as originally identified in the Proposed Plan.

- Significant Change Requiring Only Documentation in the ROD

  The Proposed Plan was released for public comment in August 1991. The Proposed Plan identified Alternative 4, excavation and onsite volatilization of VOCs, as the preferred alternative. One of the other alternatives (Alternative 6) presented in the Proposed Plan and the RI/FS involved onsite incineration and solidification of wastes. The original preference for Alternative 4 was based in part on the fact that a mobile incinerator was not readily available to implement Alternative 6. During the public comment period, however, a mobile incinerator became available. As a result, DOE, in consultation with EPA and the State Pollution Control Board, decided to select the onsite incineration remedy. Onsite incineration is a more comprehensive and reliable treatment-based remedy for the particular waste at the "DOE Site" than the volatilization remedy originally preferred.

- Significant Change Requiring a New Public Comment Period

  A Proposed Plan for the "DOE Site" was released for public comment in August 1991. The Plan identified Alternative 4, excavation and onsite volatilization of VOCs, as the preferred alternative. During the public comment period, the results of remedial activities at another site with contamination problems similar to those at the "DOE Site" indicated that an alternative treatment technology, in situ vitrification, could be used successfully on contaminants similar to those at the "DOE Site." Further analysis indicated that fewer short-term risks would be associated with the vitrification alternative than with the volatilization alternative, and that the long-term effectiveness of vitrification would be greater because the solidified matrix is expected to have a longer effective life than a RCRA landfill. Information supporting this determination is available in the Administrative Record.

  As a result of this new information, DOE decided to select in situ vitrification as the new preferred alternative for cleaning up the "DOE Site." EPA and the State Pollution


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requirements for ensuring that the public has the opportunity to comment on major remedy selection decisions, a new Proposed Plan was prepared presenting in situ vitrification as the preferred alternative. The second Plan was made available to the public in November 1991. No significant comments were received during the second public comment period, and no significant changes have been made to the selected remedy.


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Note C. **Responsiveness Summary.** The Responsiveness Summary serves several purposes. (1) It provides the decisionmakers with information about community preferences regarding both the remedial alternatives and general concerns about the site. (2) It demonstrates how public comments were integrated into the decisionmaking process. (3) It allows DOE to respond to comments "on the record," which provides documentation about how DOE responded to each issue, as required by the NCP.

Issues that DOE project managers should be familiar with when preparing responsiveness summaries are as follows:

- Responding to comments often requires significant time, which should be considered in the overall schedule for briefing decisionmakers and preparing and issuing a final ROD.

- In many instances, hundreds of comments could be submitted. Site managers can simplify the response process rather than responding individually to each comment. For example, the NCP requires responses to significant comments or comments that provide significant or new relevant information. Site managers can categorize comments by their significance, group comments that are similar, and provide one overall response.

- Response to some comments may require revising or bolstering documentation that supports technical analysis and decisions on which the remedy is selected. This may include reworking analyses based on new information provided by the commentors, reassembling personnel who worked to support technical analyses, or obtaining further expert advice on the legitimacy of the comments. This process may take substantial time and additional resources. Examples of information that may be questioned include the appropriateness of certain models used during the technical analyses, assumptions used during the risk assessment (particularly for radionuclides), or estimates of remedy cost.

- In some instances, commentors may submit information on the basis of outside technical advice. It may be necessary to review the alternative analysis provided by commentors and to justify the models used in the RI/FS. In other instances, outside technical information may require changes to the RI/FS and or the preferred alternative.

Additional information can be found in Appendix A.15 of *Guidance on Public Participation for U.S. Department of Energy Environmental Restoration Activities* (DOE, 1991).


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Note D. **No-Action, Interim Action, Contingent Action, and Final RODs.** The type of action being taken and thus the type of ROD that will be required is, in most instances, initially decided during scoping–in the consensus strategy that set the scope and goals of the RI/FS project. Discussion of the four types of RODs follows:

- **No-Action.** In some instances a ROD may determine that no action is required or (perhaps more likely at a DOE site) that no effective action is possible for a given problem. A no-action ROD must include an explicit statement that no action is required or no effective action is possible; it must also include the basis for that determination.

  No further action at a waste site or OU may be appropriate for DOE facilities under two circumstances:

  - **The site or OU poses no threat to human health and the environment.** The baseline risk assessment (see Module 2) or other information in the Administrative Record must provide a basis for concluding that a site or OU poses no threat to human health or the environment.

    The baseline risk assessment that supports the no action determination should account for both the current and reasonable maximum exposure scenarios using the appropriate health and environmental criteria and standards that relate directly to the media and hazardous substances being addressed. The sites for which no action is necessary should allow for unrestricted use or unlimited access.

  - **No effective action can be taken using currently available technology.** For some problems presented at DOE sites, no technologies are currently available on which to base a remediation. This situation will improve over the years as DOE research, development, and demonstration (RD&D) efforts bring new technologies to DOE sites. In the interim, some site remediations may have to be postponed while awaiting technology development.

    A no effective action possible determination also could result when taking action may cause more harm than taking no action. For example, implementing a technology may cause greater environmental damage than will result from leaving the contamination where it is; or the technology may increase risk to workers, the public, or the environment.

    The ROD for a site at which no effective action is possible should indicate that the statutory 5-year review (CERCLA Section 121) will be performed.


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- **Interim Action.** An interim action ROD specifies the selected remedy for a partial remediation or for an interim action to address an immediate threat. Some RODs at DOE sites will be interim action RODs, especially during the early years of the Environmental Restoration (ER) Program. Final RODs that address all of the remaining problems at an OU may not be common for some time. Interim RODs can be more streamlined than final RODs.

  Interim actions are limited in scope and require further action to fully comply with statutory requirements. Interim actions may occur at any point in the RI/FS and include either removal or interim remedial actions. Typically, interim RODs are only required for interim remedial actions, however, the compliance agreement should be consulted for confirmation. Interim Proposed Plans and RODs should be more streamlined than final action decision documents. EPA's ROD Guidance states "documentation of interim action decisions should be tailored to the limited scope and purpose of the interim action." Specific examples provided by EPA for streamlining interim Proposed Plans and RODs include the following:

  - Support the need to take action, but do not specify final acceptable exposure levels; the complete findings of the baseline risk assessment should be included in the final action decision documents.

  - Limit the number of alternatives to three or four options and limit the evaluation criteria (i.e., the nine NCP criteria) to those that are pertinent to the scope and purpose of the interim action. Numbers of alternatives may be even more limited for DOE interim actions that deal with radioactive waste sites because of the overall limitation of suitable alternatives for radioactive waste.

  - Discuss how the interim action fulfills the CERCLA Section 121 statutory determinations within its scope, rather than definitively fulfilling the statutory determinations for the site as a whole.

- **Contingent Action.** The CERCLA process allows for developing contingent RODs in order to promote the use of innovative technologies whenever potentially practicable and cost effective. A contingent ROD specifies that remediation will be attempted with an innovative technology, but also specifies an established technology that will be used as a contingency in the event that the innovative technology fails.

  - An **innovative technology** may be most appropriate when based on evaluation of the five balancing criteria. More testing of the technology may be necessary during remedial design to ensure that the technology can meet expected performance specifications. Because of the need for further testing, the analysis of alternatives (Module 5) may be less definitive for alternatives that use innovative technologies. EPA recommends that the evaluation focus on expected performance potential and uncertainties for the innovative


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technologies. DOE, in consultation with EPA and/or the State, can choose to include a "proven" technology as a back-up or contingent remedy for implementation if the innovative technology cannot fulfill performance specifications.

Contingent RODs are also used when one or more technologies appear to offer substantially equivalent advantages and disadvantages when based on the five balancing criteria. The contingent ROD specifies a preferred alternative and the criteria that will be used for implementing one of the equivalent technologies if that becomes obviously more desirable during design.

- A conclusion that certain technologies are essentially equivalent (**equivalent technologies**) may have been reached during the detailed evaluation, as based on the five balancing criteria. This can occur only when the alternatives represent the same general response action (e.g., both treat and contain on the site). The alternatives may be comparable with each balancing criteria or on an overall comparison basis. In such situations, the Proposed Plan and ROD must specify the criteria that will determine when the contingent remedy would be implemented. The criteria used to trigger implementation of a contingent remedy can be documented similarly to identification and monitoring of probable conditions and deviations under a noncontingent remedy.

Contingent remedies may be used in either final action or interim action RODs. Contingent remedies are not discussed in the NCP; however the NCP encourages the use of innovative technology when necessary or appropriate. The remedy selection process still identifies a single preferred alternative documented in the Proposed Plan and selected in the ROD. The preferred alternative and selected remedy are accompanied by a contingent remedy.

When documenting decisions using contingent remedies, EPA's ROD Guidance (OSWER Directive 9355.3-02) states that the Proposed Plan **should** and the ROD **must** identify the preferred alternative or selected remedy **and** the contingent remedy. OSWER 9355.3-02 allows specific contingent remedy in the ROD, even if a contingent remedy was not discussed in the Proposed Plan, if the contingency is a logical extension of information presented in the Proposed Plan.

The Proposed Plan and ROD must specify what criteria will be used to determine when the selected technology is not meeting expected performance criteria thus triggering implementation of the contingent remedy. The Statutory Determinations section of the ROD should discuss how either remedy fulfills the statutory requirements of CERCLA Section 121. If, during remedial action, DOE decides to implement the contingent remedy, an ESD needs to be issued and the appropriate regulatory agencies notified.


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- **Final Action.** A final action ROD addresses all of the (remaining) problems presented by an OU.

  A final action ROD is used when the RAs fully meet the two threshold criteria (protectiveness and compliance with ARARs) for all of the problems within the OU. A final action ROD also documents final resolution of issues such as final disposal and land use. These issues are particularly complex at DOE facilities where treatment and disposal options for radioactive waste are extremely limited and the issues are sensitive. For example, no permanent treatment or disposal option currently exists for transuranic (TRU) wastes. Final RODs will frequently be used as final OU decision documents. As such they will serve to make final decisions on issues left unresolved as not crucial to short-term remedial decisions. In this manner final action RODs can serve as integrating documents that collect and finalize issues remaining from many interim action RODs.


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Note E. **Example ROD.** RODs are the second set of compliance documents required during remedy selection. RODs are a legally binding document that selects the remedy and sets the bounds for remedial design and remedial action. To facilitate streamlining, RODs need to be flexible in prescribing the selected remedy. A flexible ROD can support changes to the selected remedy during design investigations, detailed design, or remedial action more readily than RODs that are highly specific about the details of the remedy to be implemented.

This example is an interim action ROD from an OU at the DOE Weldon Spring Site near St. Charles, Missouri. The OU included bulk wastes from the quarry. This ROD focused on selecting an excavation and interim storage alternative. The responsiveness summary was developed as a separate document and is not included here.

This example ROD has been edited/abbreviated (e.g., Section 7, Potentially Applicable or Relevant and Appropriate Requirements, and Section 11.2, Compliance with ARARs). The original table of contents appears in its entirety. Figures and tables are provided on a selective basis. The example has been reformatted to facilitate development of this note. It is provided for illustrative purposes and does not represent any activity currently under way at Weldon Spring Quarry.

This is the first ROD signed under DOE's ER Program. Except for abbreviated sections, it is incorporated here as it was signed. Cost estimates generally would be included for all of the alternatives, not just for the selected alternative. The Occupational Safety and Health Administration (OSHA) requirements are not generally considered to be ARARs because they are not environmental regulations (see preamble to NCP, 55 FR 8679-8680).


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RECORD OF DECISION FOR THE MANAGEMENT OF THE BULK WASTES AT THE WELDON SPRING QUARRY, WELDON SPRING, MISSOURI

September 1990

DECLARATION

The Declaration is the first section of the ROD.

SITE NAME AND LOCATION

Weldon Spring Site
St. Charles County, Missouri

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the quarry bulk waste operable unit of the Weldon Spring site in St. Charles County, Missouri. The Weldon Spring site consists of two distinct areas that comprise one contiguous site as listed on the National Priorities List (/NPL). This remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record file for this site.

The State of Missouri concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this record of decision, may present an imminent and substantial endangerment to public health and welfare, or the environment.

Finding of risk language.

DESCRIPTION OF REMEDY

This operable unit remedial action is the second of five response actions planned as part of the overall remedial action for the Weldon Spring quarry. The first response action to be initiated at the quarry is a removal action involving treatment of contaminated surface water and discharge of the treated water to the Missouri River. An engineering evaluation/cost analysis (EE/CA) report has been prepared to evaluate alternatives for management of this water. The quarry water removal action is expected to be initiated in 1991.

The function of this operable unit is to remove bulk wastes from the quarry. This will eliminate the wastes as a potential continuing source of groundwater contamination and minimize risks associated with exposure to contaminants released into the air. It will also facilitate additional characterization of the wastes and residual contamination in and around the quarry.

Purpose of this OU.


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Bulk wastes are defined as materials that can be removed from the quarry using standard equipment and procedures. This remedial action is not the final remedial action for the quarry, and it does not address final disposition of the bulk wastes. Disposal decisions for these wastes will be made as part of the remedial action decision for the chemical plant area of the Weldon Spring site. These decisions are being addressed in a remedial investigation and feasibility study which is currently in preparation. A decision on the final remedial action for the quarry will be made in a subsequent decisionmaking process after the bulk wastes have been removed.	**This is an interim action ROD.**
The major components of the selected remedy include: • Removal of the bulk wastes from the quarry using standard equipment and procedures. • Transporting the bulk wastes along a dedicated haul road to the chemical plant area of the Weldon Spring site. • Placing the bulk wastes in controlled storage in an engineered temporary storage facility.	
Following removal of the wastes, detailed studies will be made of the empty quarry and local groundwater system. These studies will facilitate decisions with regard to the three remaining components of the quarry remedial action, i.e., (1) residual materials remaining in the quarry walls and fissures, (2) groundwater, and (3) vicinity properties. The vicinity properties are contaminated properties that are outside the quarry and for which the U.S. Department of Energy is responsible (e.g., the Femme Osage Slough). Comprehensive response actions for residual materials, groundwater, and vicinity properties can be developed only after the bulk wastes have been removed from the quarry so that the nature and extent of residual contamination and migration pathways can be fully assessed. These actions, which will address final quarry cleanup criteria, will be developed in consultation with Region VII of the U.S. Environmental Protection Agency (EPA) and the State of Missouri and will be described in future documents.	
DECLARATION	**Required findings: protectiveness, ARARs compliance, cost-effectiveness, permanence.**
The selected remedy is protective of human health and the environment; it complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, unless those requirements have been properly waived in accordance with CERCLA; and it is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable given the limited scope of this remedial action. However, because this action constitutes neither the final remedy for the quarry nor the final decision for disposition of the bulk wastes, it does not satisfy the statutory preference for treatment as a principal element of the remedy. Potential treatment technologies will be considered in the process for selection of the final remedy for the quarry and for final disposition of the bulk wastes.	**Does not meet CERCLA expectation for use of treatment and the reason why.**


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Because this remedy may result in hazardous substances remaining on site above health-based levels, a review conducted within five years after commencement of this remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. [SIGNED] 9/28/90 Regional Administrator, U.S. Environmental Protection Agency Region VII — Date [SIGNED] 3/7/91 Oak Ridge Operations Office Manager, U.S. Department of Energy — Date	**CERCLA requirement for five-year reviews.**


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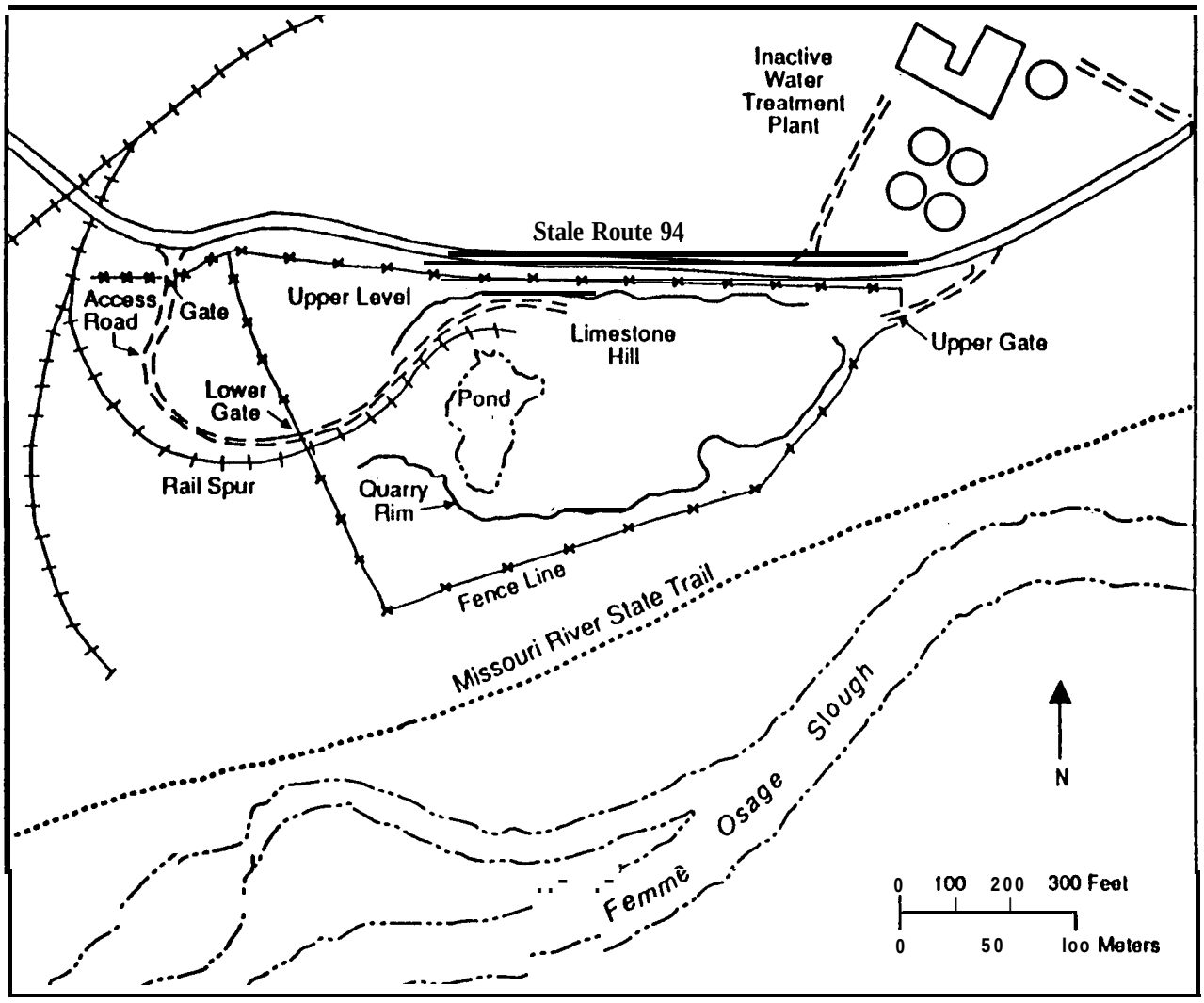

FIGURE 3

LAYOUT OF THE WELDON SPRING QUARRY

DECISION SUMMARY

1 SITE NAME, LOCATION, AND DESCRIPTION

The Decision Summary is the second section of the ROD. It is usually the longest section.

The Weldon Spring site is located in St. Charles County, Missouri, near the city of Weldon Spring, about 48 km (30 mi) west of St. Louis (Figure 1). The site consists of two noncontiguous areas: (1) the chemical plant area and (2) the quarry. The chemical plant area is about 3.2 km (2 mi) southwest of the junction of Missouri (State) Route 94 and U.S. Route 40/61. The quarry is about 6.4 km (4 mi) south-southwest of the chemical plant area and about 8 km (5 mi) southwest of the town of Weldon Spring. Both the chemical plant area and the quarry are accessible from State Route 94 and are fenced and closed to the public. The locations of the chemical plant area and the quarry are shown in more detail in Figure 2.

Figure omitted.

Figure omitted.

The chemical plant area covers about 88 ha (217 acres) and contains various buildings and ponds (including four raffinate pits) as well as gravel and paved surfaces. Vegetation in this area is predominantly grasses, shrubs, and small trees. The August A. Busch Memorial Wildlife Area is located to the north, the Weldon Spring Wildlife Area to the south and east, and the U.S. Army Reserve and National Guard Training Area to the west.

The quarry was excavated into a limestone bluff that forms a valley wall at the edge of the Missouri River alluvial floodplain. Prior to 1942, it was mined for limestone to support various construction activities. The quarry is about 300 m (1,000 ft) long by 140 m (450 ft) wide and covers an area of approximately 3.6 ha (9 acres). The main floor comprises approximately 0.8 ha (2 acres) and currently contains about 11,000 m (3,000,000 gal) of ponded water covering about 0.2 ha (0.5 acre). The quarry is vegetated with grasses, shrubs, and trees, and is surrounded by the Weldon Spring Wildlife Area. The general layout is shown in Figure 3.

The Missouri-Kansas-Texas Railroad line formerly passed just south of the quarry. This line was recently dismantled, and the right-of-way has been converted to a gravel-based public trail for hiking and biking (the Missouri River State Trail). A rail spur enters the quarry at its lower level from the west and extends approximately one-third of its length. The spur is overgrown with vegetation and is in a state of disrepair. The St. Charles County well field is located to the southeast between the quarry and the Missouri River (Figure 4). The nearest well is located about 0.8 km (0.5 mi) from the quarry.

Figure omitted.

The quarry and the chemical plant area are related as to history and purpose, are reasonably close in proximity, and are compatible with regard to remediation approach. Therefore, they are considered one Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site for purposes of this response action.


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2 SITE HISTORY

In April 1941, the U.S. Department of the Army acquired about 7,000 ha (17,000 acres) of land in St. Charles County, Missouri, for construction of the Weldon Spring Ordnance Works. From November 1941 through January 1944, the Atlas Powder Company operated the ordnance works for the Army to produce trinitrotoluene (TNT) and dinitrotoluene (DNT) explosives. The ordnance works was reopened during 1945 and 1946 but was closed and declared surplus to Army needs in April 1946. By 1949, all but about 810 ha (2,000 acres) had been transferred to the State of Missouri (now the August A. Busch Memorial Wildlife Area) and the University of Missouri (as agricultural land). Much of the land transferred to the University of Missouri was subsequently developed into the Weldon Spring Wildlife Area. Except for several small parcels transferred to St. Charles County, the remaining property became the current chemical plant area and adjacent U.S. Army Reserve and National Guard Training Area.

The U.S. Atomic Energy Commission (AEC), a predecessor of the U.S. Department of Energy (DOE), acquired 83 ha (205 acres) of the former ordnance works property from the Army by permit in May 1955, and the property transfer was approved by Congress in August 1956. An additional 6 ha (15 acres) was later transferred to the AEC for expansion of waste storage capacity. The AEC constructed a feed materials plant, now referred to as the chemical plant, on the property for the purpose of processing uranium and thorium ore concentrates. The quarry, which had been used by the Army since the early 1940s for disposal of chemically contaminated materials, was transferred to the AEC in July 1960 for use as a disposal site for radioactively contaminated materials.

The feed materials plant was operated for the AEC by the Uranium Division of Mallinckrodt Chemical Works from 1957 to 1966. During this period, the AEC used the quarry to dispose of uranium and thorium residues (drummed and uncontained), radioactively contaminated building rubble and process equipment, and TNT and DNT residues from cleanup of the former ordnance works. Following closure by the AEC, the Army reacquired the chemical plant site in 1967 and began converting the facility for herbicide production. The buildings were partially decontaminated, and some equipment was dismantled. Contaminated rubble and equipment from some buildings were placed in the quarry. In 1969, prior to becoming operational, the herbicide project was canceled. Since that time, the plant has remained essentially unused and in caretaker status.

In 1971, the Army returned the 21-ha (51-acre) portion of the property containing the raffinate pits to the AEC but retained control of the rest of the chemical plant area. As successor to the AEC, the DOE assumed responsibility for the raffinate pits. In 1984, the Army repaired several of the buildings; decontaminated some of the floors, walls, and ceilings; and removed some contaminated equipment to areas outside of the buildings. In May 1985, the DOE designated control and decontamination of the Weldon Spring site as a major Federal project under its Surplus Facilities


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Management Program. In May 1988, the DOE redesignated the project as a major system acquisition.

On October 1, 1985, custody of the Army portion of the chemical plant area was transferred to the DOE. On October 15, 1985, the U.S. Environmental Protection Agency (EPA) proposed to include the Weldon Spring quarry on its National Priorities List (NPL); this listing occurred on July 22, 1987. On June 24, 1988, the EPA proposed to expand the listing to include the chemical plant area. This proposal was finalized on March 13, 1989, and the expanded site was placed on the NPL under the name "Weldon Spring Quarry/Plant/Pits (USDOE/Army)." The balance of the former Weldon Spring Ordnance Works property, which is adjacent to the DOE portion and for which the Army has responsibility, was included on the NPL as a separate listing on February 21, 1990, under the name "Weldon Spring Former Army Ordnance Works."

A summary of disposal activities at the quarry is presented in Table 1. Based on historical data and characterization results, an estimated 73,000 m^3 (95,000 yd^3) of contaminated materials is present in the quarry; of this, approximately 31,000 m^3 (40,000 yd^3) is rubble, 39,000 m (51,000 yd^3) is soil and clay, and 3,000 m^3 (4,000 yd^3) is pond sediment.

Table omitted.


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4 SCOPE AND ROLE OF OPERABLE UNIT

The DOE is addressing the quarry bulk wastes as an operable unit remedial action (OURA) as part of the overall remedial action planned for the Weldon Spring site. The two general types of remedial actions that can be addressed as OURAs are (1) final actions that completely remediate a discrete area of a site or (2) interim actions taken to facilitate cleanup and to mitigate an ongoing release or threat of a release or to limit a potential pathway of exposure. Remedial action for the quarry bulk wastes falls into the second category. The implementation of a response action as an OURA must be consistent with the permanent remedy for the entire site, even though the action might be implemented prior to selection of the final remedy.

Interim action.

Defining the quarry bulk wastes as an OURA of the Weldon Spring site makes it possible to expedite management of these wastes. This action does not address final disposal of the quarry bulk wastes. As discussed in more detail below, that decision will be made as part of a subsequent remedy selection process for the chemical plant area.

Quarry bulk wastes are defined as the chemically and radioactively contaminated solids present in the quarry that can be removed using standard equipment and techniques. The total volume of these wastes–which consist primarily of soils, sludges, equipment, and structural debris–is about 73,000 m^3 (95,000 yd^3).

Management of the bulk wastes is one of five separate components of the overall environmental response under consideration for the quarry (Figure 6). The five components are (1) surface water, which provides the hydraulic gradient for contaminant migration to groundwater; (2) bulk wastes, which constitute the source of contaminants migrating into the air and underlying groundwater at the quarry; (3) materials remaining in the quarry walls and floor after bulk waste removal (i.e., residuals); (4) groundwater; and (5) vicinity properties, which are contaminated properties outside the quarry for which the DOE is responsible (e.g., the Femme Osage Slough).

Relationship of this OU to the other defined OUs. (Figure omitted.)

In response to a potential threat to the nearby St. Charles County alluvial well field, management of contaminated surface water is the first of these five components being addressed. This well field supplies drinking water to more than 60,000 residents of St. Charles County. It is located within 1.6 km (1 mi) of the quarry. The quarry pond is providing a hydraulic gradient for contaminant migration into the local groundwater because the pond surface is higher than the nearby groundwater table.

The purpose of the quarry bulk waste OURA is to minimize the potential for further migration of contaminants from the quarry into the environment and to facilitate overall site cleanup by making it possible to assess the extent of residual contamination in the quarry and identify pathways for migration of contaminants from the quarry. The bulk wastes constitute the source of contaminants that are being released into the air at the quarry and which are migrating through the fractured walls and floor of the quarry into the underlying groundwater.

Purpose of the OU.


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5 SITE CHARACTERISTICS

5.1 SETTING ...

Abbreviated sections.

5.2 WASTE CHARACTERISTICS ...

A more extensive chemical characterization study was conducted at the quarry in 1986 when samples were taken from 17 boreholes. The depths of the boreholes were highly variable, ranging from 0.61 m (2 ft) to 12 m (40 ft). The borehole locations were selected on the basis of historical data on waste disposal at the quarry.

Many of the discussions in the ROD can be very brief, relying on the RI and FS reports for backup.

Nitroaromatic compounds, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs) were detected in these samples. The results of this study are summarized in Table 4. Because of the heterogeneous nature of the wastes and the limited number of samples taken, the results are expected to be indicative of, rather than representative of, the wastes present in the quarry.

Table omitted.

Three surface samples were collected in May 1987 from an area in the northeastern corner of the quarry where surficial discoloration suggested the presence of nitroaromatic compounds. Various nitroaromatic compounds were detected in the samples. The compound 2,4,6-TNT was detected at an average concentration of 13,000 mg/kg. The results of the analyses for nitroaromatic compounds are summarized in Table 5.

Table omitted.

These characterization results indicate that chemical contamination is present throughout much of the quarry bulk wastes and that the distribution of the contaminants is highly heterogeneous. However, general locations of various waste types can be defined in some cases. For example, nitroaromatic compounds are found in the eastern end of the quarry, which is consistent with the disposal history. The PCBs do not show a defined pattern of distribution but are typically limited to near-surface depths (0 to 1.8 m [0 to 6 ft]). Most chemical contaminants are found at depths of less than 3.6 m (12 ft).


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6 SUMMARY OF SITE RISKS

A baseline risk evaluation (BRE) was prepared to assess the potential risks associated with the contamination present at the quarry. Risk assessment is a key component of the RI/FS process and is typically conducted for the baseline (no-action) case to (1) determine potential impacts to human health and the environment, (2) support the determination of appropriate cleanup criteria, and (3) provide a basis for evaluating the effectiveness of proposed remedial action alternatives. However, because management of the bulk wastes is a focused interim action of the overall remedial action for the quarry, the scope and purpose of this assessment was less comprehensive than that generally performed in a baseline risk assessment. Because site characterization data on the nature and extent of the contamination and the pathways and mechanisms for contaminant migration from the quarry is limited, a comprehensive baseline risk assessment could not be prepared. For this reason, the assessment was referred to as a baseline risk "evaluation," to distinguish it from the more comprehensive baseline risk "assessment." The analyses in this risk evaluation were carried out to meet, within the limits of available data, the first of the three objectives of a risk assessment, i.e., to assess the potential impacts on human health and the environment. The scope of the evaluation was limited to an assessment of the potential risks associated with the bulk wastes. It addressed exposures that could occur in the short term under existing site conditions. Risks will be assessed further as part of other RI/FS processes before the wastes are finally disposed of and the overall remediation of the quarry is completed.

The need for remedial actions derives from the site risks.

Proceeding where reasonable despite limited data.

6.1 CONTAMINANT IDENTIFICATION ...

Abbreviated sections.

6.2 EXPOSURE ASSESSMENT ...

6.3 POTENTIAL HEALTH RISKS

The BRE assessed the radiological and chemical health risks resulting from potential exposures to the quarry contaminants under current site conditions. Health effects resulting from radiation exposure were evaluated in terms of the increased likelihood of inducing fatal cancers and serious genetic effects in future generations. The risk of cancer induction from the radionuclides present in the quarry bulk wastes is much greater than the risk of serious genetic effects. The potential for adverse health effects (other than cancer) from exposure to chemical contaminants was assessed by dividing the estimated average daily intake by established reference doses. This calculation determined the "hazard index." A hazard index of less than 1 indicates a nonhazardous situation while a hazard index greater than 1 indicates a potential for adverse health effects.

The estimated carcinogenic risks and hazard indexes for the passerby and trespasser scenarios are summarized in Table 6. The carcinogenic risks from radiation exposures range from 4.2×10^{-6} for the passerby representative exposure case to 8.7×10^{-5} for the trespasser plausible maximum exposure

See p. 6-125.


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case, and the carcinogenic risks from chemical exposures range from 1.0×10^{-9} to 3.6×10^{-5}, respectively. The risk from radiation exposure exceeds that from chemical exposure for both scenarios. The major exposure pathway for the radiological risk in all cases is inhalation of radon-222 and its short-lived decay products. The major contributor to the chemical carcinogenic risk for the trespasser is 2,4,6-TNT, which accounts for approximately 40% of the risk; arsenic, PCBs, and PAHs account for the remaining 60%.

The very low hazard indexes estimated for the passerby scenario (less than 2×10^{-3}) indicate that there is little potential for noncarcinogenic health impacts to individuals outside the quarry. However, for the trespasser, the hazard index is 2.0 for the representative exposure case and 8.5 for the plausible maximum exposure case. For both cases, the major contributor to the noncarcinogenic hazard is exposure to 2,4,6-TNT. This is not unexpected given the presence of this contaminant at concentrations greater than 1% in surface soils at the quarry. The estimated hazard indexes for 2,4,6-TNT are 1.7 and 7.2 for the representative and plausible maximum trespasser exposure cases, respectively. These results indicate the potential for the occurrence of adverse health effects to an unprotected individual frequently entering the quarry. However, under current site conditions in which access to the quarry is restricted, it is unlikely that an individual would routinely enter the quarry.


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Table 6
Carcinogenic Risks and Health Hazard Indexes for the Passerby and Trespasser Scenarios

Exposure Scenario/Case	Carcinogenic Risks: Radiological[a]	Carcinogenic Risks: Chemical[b]	Health Hazard Index for Noncarcinogenic Effects[c]
Passerby			
Representative	4.2×10^{-6}	1.0×10^{-9}	1.0×10^{-3}
Plausible Maximum	1.2×10^{-5}	3.0×10^{-9}	1.6×10^{-3}
Trespasser			
Representative	6.0×10^{-6}	4.3×10^{-6}	2.0
Plausible Maximum	8.7×10^{-5}	3.6×10^{-5}	8.5

[a]Risk of a fatal cancer; the rate of cancer induction will be higher.

[b]Rate of cancer induction. The NCP establishes that, for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response.

[c]"The health hazard index is a measure of the potential for adverse chronic health effects other than cancer. A value greater than 1 indicates a potential for adverse health effects.

6.4 POTENTIAL ENVIRONMENTAL RISKS

The potential risks to the environment considered in the BRE were impacts on soil resources, air quality, vegetation and wildlife, and water resources. No adverse impacts have been observed for soil resources, air quality, or vegetation and wildlife as a result of the bulk wastes in the quarry. The major impact that could result from gaseous releases, i.e., radon, is addressed in the human health assessment portion of the BRE.

Water resources have been impacted by the presence of the bulk wastes. The ponded water is already contaminated as a result of contact with the bulk wastes, but incremental contamination from continued contact, e.g., future surface runoff, is not expected to significantly alter the existing water quality. Similarly, Femme Osage Slough, south of the quarry, already contains radioactive and chemical contaminants. This contamination may have resulted from subsurface migration from areas north of the slough and/or from past discharges into Little Femme Osage Creek. Groundwater in the


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vicinity of the quarry has been contaminated as a result of contaminant migration from the bulk wastes. If the bulk wastes remain in the quarry, contaminants could migrate farther into the surrounding environment via the fractured limestone of the Kimmswick Limestone Formation, and contaminant concentrations might increase in the vicinity of Femme Osage Slough.


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7 POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ...	**Abbreviated section.**


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8 DESCRIPTION OF ALTERNATIVES

Following an analysis of potentially applicable response technologies that might satisfy the remedial action goals for the operable unit, five alternatives were developed for further consideration. In addition, a no-action alternative was included to provide the baseline for a comparative evaluation. Hence, six preliminary remedial alternatives have been evaluated. These alternatives are as follows.

Like other discussions, the development and screening of alternatives is brief, relying on the FS for the detailed presentation.

8.1 ALTERNATIVE 1: NO ACTION

The no-action alternative is included as a baseline for comparison with the other alternatives. As part of this baseline condition, no further action would be taken at the quarry, i.e., the bulk wastes would remain in their current condition but the quarry water treatment plant, selected as a removal action under the preceding EE/CA, would be in operation. Institutional controls currently in effect at the quarry, including fences and locked gates, monitoring, and site ownership, would remain in place.

8.2 ALTERNATIVE 2: SURFACE CONTAINMENT

Under Alternative 2, all surface vegetation would be removed and a surface containment layer, such as a soil cap or synthetic geotextile fabric, would be installed over the entire area of the quarry. Surface containment would reduce the release of contaminants via surface pathways (e.g., wind dispersal) and could limit percolation of precipitation or snowmelt through contaminated materials in the bulk wastes. This would reduce contaminant migration into the groundwater. However, since the bulk wastes would remain in contact with the groundwater, contaminant migration resulting from lateral flow of groundwater through the bulk wastes would not be reduced.

8.3 ALTERNATIVE 3: SURFACE AND SUBSURFACE CONTAINMENT

Under Alternative 3, the quarry bulk wastes would be isolated in place by installing a surface layer, as in Alternative 2, in conjunction with placement of a natural or polymeric grouting material around the periphery of the quarry and beneath the entire area at a depth greater than that of the buried wastes. The components of Alternative 3 are the same as those of Alternative 2, i.e., surface preparation and installation of a surface containment layer, with the addition of subsurface containment. The containment system for Alternative 3 would consist of an underlying confinement layer and lateral cutoff walls installed around the periphery of the bulk wastes, in addition to the surface cover or cap. A continuous surface and subsurface containment system would minimize contaminant migration resulting from lateral migration of groundwater through the bulk wastes. It would also reduce surface releases of contaminants and contaminant migration due to percolation of precipitation and snowmelt through the bulk wastes. The subsurface containment system could be


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installed by drilling through the wastes and injecting a confining layer around and beneath the entire quarry.

8.4 ALTERNATIVE 4: IN SITU TREATMENT

Under Alternative 4, the contaminated materials would be solidified in situ by mixing them with a cementitious material to form a solid mass or by vitrifying them with an electrical current to form a glass-like matrix. The resultant waste would limit surface releases, percolation, and lateral and downward migration of contaminants. The effectiveness of in situ treatment cannot be guaranteed due to uncertainties associated with verifying treatment success and ensuring the integrity of the solidified waste over time. If cementation were used, complete mixing and stabilization would be difficult to ensure because the bulk wastes extend over a significant area and depth and include process equipment and other unwieldy debris. In situ vitrification is generally feasible only if the wastes contain less than 5% metal by weight and if less than 90% of the linear separation between electrodes is occupied by metal. In situ vitrification is infeasible because of the metal debris, e.g., drums, process equipment, and building rubble, scattered throughout the quarry.

8.5 ALTERNATIVE 5: EXPEDITED EXCAVATION WITH TEMPORARY STORAGE AT THE CHEMICAL PLANT AREA

Under Alternative 5, the bulk wastes would be excavated from the quarry and transported along a dedicated haul road to the chemical plant area. There, they would be unloaded and temporarily stored in an engineered facility pending a final decision on disposal of all wastes generated by remediating the Weldon Spring site. Transportation activities and construction and maintenance of the temporary storage facility would be carried out in a manner that would minimize potential releases of contaminants to the environment. Limited treatment would be conducted, as appropriate, to facilitate implementation (e.g., post-excavation dewatering to facilitate waste transport and storage control). Subsequent treatment and/or disposal would be addressed in conjunction with other on-site materials after completion of the RI/FS-EIS process and approval of the record of decision for remediation of the chemical plant area.

A variation of this alternative was considered at the preliminary analysis stage, i.e., excavation and replacement of the bulk wastes back into the quarry for temporary storage after chemical sealant or a liner had been placed in the quarry. However, technical difficulties associated with cover and seal emplacement would compromise the effectiveness of this option, and protection of human health and the environment could not be ensured. In addition, the availability of land at the quarry for staging is extremely limited due to constraints imposed by ownership and topography. Therefore, storage of the required volume of material pending preparation of the quarry for waste emplacement would be infeasible. Thus, this variation was not considered further.


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8.6 ALTERNATIVE 6: DELAYED ACTION PENDING THE RECORD OF DECISION FOR THE SITE

Under Alternative 6, no response action would be taken with respect to the quarry bulk wastes until the remedy is selected for the entire Weldon Spring site. Thus, the bulk wastes would remain in their current condition for the short term.

8.7 EVALUATION OF PRELIMINARY ALTERNATIVES

Migration control at the quarry (via containment) is the primary emphasis of Alternatives 2 and 3, whereas source control (via excavation and/or treatment) is the primary emphasis of Alternatives 4 and 5. Alternative 6 (delayed action) is essentially the same as Alternative 1 (no action) in the short term. For purposes of evaluating alternatives, Alternative 6 is expected to be similar to one of the action alternatives (i.e., Alternatives 2 through 5) in the long term. However, this would depend upon the action selected following the delay.

Each of the action alternatives would require various support activities prior to implementation. These activities include (1) design and construction of staging and support areas, (2) procurement of appropriate equipment, and (3) development of planning and operational controls to minimize contaminant releases. In addition, the institutional controls that now exist at the quarry, i.e., DOE ownership, fences and locked gates, and monitoring, are implicitly included as support activities for the alternatives, as appropriate. Under the action alternatives, these controls would be upgraded as needed. For example, certain portions of the fence and gates would be repaired, additional signs would be posted, and monitoring would increase.

These preliminary alternatives were screened in the FS according to the three screening criteria provided in the NCP: effectiveness, implementability, and cost. Effectiveness is defined as the ability of an alternative to protect human health and the environment in both the short term and the long term. The reduction of contaminant toxicity, mobility, or volume is considered a measure of effectiveness. Implementability is defined as the technical feasibility, resource availability, and administrative feasibility (i.e., acceptability) of an alternative. Costs can be considered on a relative basis at the screening stage but cannot be the sole reason for eliminating an alternative from consideration.

Screening results.

Results of the screening of preliminary alternatives are presented in Table 8. Based on this screening, three final alternatives were identified for managing the quarry bulk wastes:

- Alternative 1: No action.
- Alternative 5: Expedited excavation with temporary storage at the chemical plant area.
- Alternative 6: Delayed action pending the record of decision for the site.


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9 SUMMARY OF COMPARATIVE ANALYSIS OF FINAL ALTERNATIVES

9.1 EVALUATION OF THE FINAL ALTERNATIVES

The comparative analysis of the alternatives is emphasized in the ROD.

The final alternatives for managing the quarry bulk wastes were evaluated according to the nine criteria provided in the NCP for final remedial actions, as appropriate to this interim action. These evaluation criteria are:

- Threshold criteria -- Overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements.
- Primary balancing criteria -- Long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost.
- Modifying criteria -- State acceptance and community acceptance.

9.1.1 No Action

Consist with EPA guidance, the no-action alternative was carried through the detailed evaluation phase of the remedial action decision making process to provide a baseline for comparison with the remaining final alternatives. The no-action alternative would not be protective of human health and the environment. Contaminant toxicity, mobility, and volume would not be reduced. The no-action alternative would not be effective in either the short term or the long term. Radon releases from the uncontrolled wastes, which have exceeded regulatory limits, would continue at present levels as would releases of other materials. The no-action alternative would not provide a permanent remedial action solution at the quarry.

Timeliness, engineering controls, construction and operational factors, waste handling and implementation requirements, and costs do not apply to the no-action alternative.

9.1.2 Expedited Excavation with Temporary Storage at the Chemical Plant Area

Under the expedited excavation and temporary storage alternative, the bulk wastes would be excavated from the quarry with standard equipment and practices, then transported along a dedicated haul road to the chemical plant area of the Weldon Spring site. There, the wastes would be unloaded and temporarily stored in an engineered facility pending a final decision on disposal of all wastes generated by remediating the Weldon Spring site. The storage facility would be constructed and maintained in a manner that would minimize potential releases. Limited treatment may be conducted as appropriate to facilitate implementation (e.g., dewatering could be used after excavation to facilitate waste transport and storage). This alternative would


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expedite cleanup without adversely affecting ultimate waste management decisions for the Weldon Spring site or limiting the choice of reasonable alternatives. Subsequent treatment and/or disposal of the bulk wastes would be addressed in conjunction with other on-site materials in the RI/FS-EIS that is being prepared for remediation of the chemical plant area.

The total volume of materials that would be handled if this alternative were implemented is estimated to be about 110,000 m^3 (140,000 yd^3). This volume includes materials resulting from preparatory clearing and grubbing activities at the quarry, the excavated bulk wastes, uncontaminated materials excavated along with the wastes, expansion of excavated materials following their removal from the quarry, and a 15% contingency factor. An estimated 15 months would be required to implement this alternative at a cost of about $11 million. These figures, however, are preliminary and may increase as engineering design is completed. Institutional controls would consist of continued site ownership, monitoring, and improvement and extension of existing physical barriers as needed (e.g., for the haul road and quarry support area). Engineering controls would be implemented to minimize potential releases of contaminants (e.g., radon and fugitive dusts) in order to ensure protection of the workers, the public, and the environment during the action period. These controls include limiting the extent of the work area and wetting and/or covering exposed surfaces at the quarry; controlling the speed of transport vehicles on the haul road; and utilizing liners, run-on/runoff control systems, and covers for the temporary storage facility at the chemical plant area.

The expedited-action alternative would be timely and would support overall protection of human health and the environment at the quarry in both the short term and the long term. This alternative would (1) reduce contaminant toxicity, mobility, and volume through source control; (2) reduce contaminant mobility of the excavated wastes by placing them in controlled storage in the chemical plant area; and (3) facilitate subsequent response activities at the Weldon Spring site, including follow-on quarry remediation, waste characterization, and comprehensive waste management decisions. Hence, this alternative is consistent with, and would contribute to, a permanent solution at the quarry and the efficient performance of overall remedial actions being planned for the site. Furthermore, it could be implemented with readily available equipment and standard engineering procedures. It would also be cost effective because it would limit both inflationary effects and potential increased cleanup efforts that would result if contamination at the quarry spread before a response was implemented.

9.1.3 Delayed Action Pending the Record of Decision for the Site

Under this alternative, no action would be taken for the quarry bulk wastes until a decision was made regarding the ultimate disposition of the entire Weldon Spring site. Rather than being expedited, remedial action at the quarry would be postponed until the site record of decision was approved. This approval would follow issuance of the RI/FS-EIS currently being


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prepared. Hence, this alternative is similar to the no-action alternative in the short term. The delay period is expected to last two to five years.

In the longer term, when the response was implemented following the delay period, many of the considerations for this alternative could be similar to those for the expedited-action alternative, i.e., if an excavation alternative were eventually selected pursuant to the record of decision. That is, waste handling and implementation requirements and engineering and institutional controls would be similar to those for the expedited excavation alternative. Delaying initiation of a response action would result in continued migration of contamination from the quarry, and this could adversely impact human health and the environment. The cost of implementing this alternative is expected to increase because of inflation; the total cost of comprehensive quarry remediation could increase even further if the extent of contamination and the resultant scope of required cleanup increased as a result of the delay.

9.2 COMPARISON TO THE NINE EVALUATION CRITERIA

9.2.1 Threshold Criteria

9.2.1.1 Overall Protection of Human Health and the Environment

Of the three final alternatives, the expedited-action alternative would provide the greatest short-term level of protection of human health and the environment. It would control the primary source of ongoing contaminant releases via air and groundwater and maintain the wastes in controlled storage at a facility engineered to prevent contaminant releases to the environment. The no-action alternative would not be protective of human health and the environment in either the short term or long term since releases would continue unmitigated. While the delayed action alternative would not provide such protection in the short term, it is expected that at such time as the final quarry remedial action decision is made, a remedy providing a similar level of long-term protection would be selected.

9.2.1.2 Compliance with ARARs

The only identified requirement that is currently not being met and is applicable to the no-action and delayed-action alternatives is the State requirement of 1 pCi/l outside a controlled area. Since radon-222 levels currently exceed this limit at the quarry fence line, these alternatives would not comply with this requirement. While the expedited-response action could not meet this requirement during implementation, the requirement could be achieved upon completion of the remedial action both at the quarry and at the temporary storage area.

RCRA Subtitle C requirements for closure of a landfill are also considered relevant and appropriate requirements for the no-action alternative, but the alternative would not meet this requirement. Since the expedited-action alternative is not considered the final remedial action for the quarry, landfill closure requirements are not considered to be relevant and


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appropriate. Even if RCRA closure requirements were considered relevant and appropriate to excavation at the quarry, they could properly be waived pursuant to Section 121(d)(4)(A). This is because the quarry bulk waste remedial action is only part of a total remedial action which will attain that standard upon completion. The applicability and relevance and appropriateness of the closure requirements to the delayed-action alternative would be determined at the time the final remedy selection decision is made.

The expedited-response action can be conducted in compliance with other Federal and State ARARs.

9.3 PRIMARY BALANCING CRITERIA

9.3.1 Long-term Effectiveness and Permanence

The expedited-action and delayed-action alternatives provide similar levels of long-term effectiveness and permanence. The no-action alternative would not be effective over the long term and would not provide a permanent remedy for the quarry.

9.3.2 Reduction of Toxicity, Mobility, and Volume through Treatment

The no-action alternative would not reduce the toxicity, mobility, or volume of the wastes through treatment. The expedited-action and delayed-action alternatives are expected to provide a comparable degree of reduction in waste mobility by removing the bulk wastes to a separate area of the site where storage could be controlled. However, the reduction in waste mobility would not be timely in the delayed-action alternative because of the delay period. The wastes would be subsequently treated and/or disposed of pursuant to the decisions made in the RI/FS-EIS currently being developed for the Weldon Spring site. Neither alternative would reduce the toxicity or volume of the bulk wastes.

9.3.3 Short-Term Effectiveness

The expedited-action alternative would provide a timely response to ongoing releases of contaminants to the environment. The no-action and delayed-action alternatives would not be effective in the short term.

9.3.4 Implementability

The expedited-action and delayed-action alternatives are both technically and administratively feasible. Implementability does not apply to the no-action alternative.

9.3.5 Cost

The expedited-action alternative is estimated to cost about $11 million. The cost of implementing the delayed-action alternative cannot be estimated at this time. However, assuming the delayed action is similar to


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the proposed expedited action, costs would be somewhat higher because of inflation. Furthermore, the total cost of comprehensive quarry remediation could increase even further if the extent of contamination and the resultant scope of required cleanup efforts increased as a result of the delay. The no-action alternative has no cost.	
9.4 MODIFYING CRITERIA	
9.4.1 State Acceptance	
The State of Missouri supports the selected alternative.	**Required declaration.**
9.4.2 Community Acceptance	
A public comment period was held from March 5, 1990, through April 9, 1990. In addition, a public meeting was held on March 29, 1990, to explain the preferred remedy and elicit comments from the public. Public comments received during the comment period indicate that the majority of the community directly impacted by this action (i.e., residents of St. Charles County) support the expedited-action alternative. With the exception of members of the Coalition for the Environment, citizens in neighboring counties provided no comments on the proposed action. Members of the Coalition for the Environment, who reside in St. Louis County, oppose the expedited-action alternative citing a lack of characterization data and engineering detail in the RI/FS and supporting documents. This organization stated that more information is needed before one of the alternatives is selected. No group or individual supported any of the rejected alternatives. Responses to the comments received during the public comment period are included in the responsiveness summary, which was prepared as a separate document. A summary of the major issues raised during the public comment period is included in this record of decision.	


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10 SELECTED REMEDY

Based on an evaluation of the final alternatives for managing the quarry bulk wastes, expedited action has been selected as the remedy. Under this alternative, the bulk wastes will be excavated from the quarry, transported along a dedicated haul road, and placed in controlled storage in the chemical plant area pending a final decision on disposal of all wastes generated by remediating the Weldon Spring site.

The expedited-action alternative represents the best balance among the evaluation criteria for remedial actions. The no-action and delayed-action alternatives would not support a permanent solution during the short term, and they would hinder the decision making process for, and implementation of, overall site cleanup. Timeliness, implementability, and cost do not apply to the no-action alternative. Although implementation of the delayed action alternative might be similar to that of the currently preferred alternative during the action period, it is not considered timely because of the delay. Delaying cleanup could also increase the contaminant migration problem which would negatively impact overall protectiveness and cost effectiveness.

Expedited excavation of the bulk wastes would protect human health and the environment by (1) controlling the primary source of ongoing contaminant releases via air and groundwater and (2) maintaining the wastes in controlled storage at a facility engineered to prevent contaminant releases to the environment. Expedited excavation would also promote the effectiveness of site cleanup by facilitating detailed characterization of (1) the quarry subsurface to address complete follow-on remediation, and (2) the bulk wastes to support comprehensive waste management decisions for the project.


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11 STATUTORY DETERMINATIONS

The Decision Summary includes an explanation of how the selected remedy fulfills statutory requirements and CERCLA expectations.

Consistent with the statutory requirements of Section 121 of CERCLA, as amended, remedial actions should be selected that:

- Are protective of human health and the environment.
- Comply with ARARs.
- Are cost effective.
- Utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.
- Satisfy the preference for treatment which, as a principle element, reduces toxicity, mobility, and volume.

The quarry bulk waste remedial action is only one of several actions that will be taken to remediate the Weldon Spring site (see Figure 5). The manner in which this focused action satisfies these five requirements is discussed in the following subsections.

11.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy is protective of human health and the environment by (1) controlling the primary source of ongoing contaminant releases from the quarry via air and groundwater and (2) maintaining the wastes in controlled storage at a facility engineered to prevent release of contaminants to the environment. Although the quarry bulk wastes do not pose a significant risk to human health and the environment in the short term, the continued presence of the bulk wastes could pose significant threats in the future.

The bulk wastes contain elevated concentrations of both radioactive and chemical contaminants, and the limestone underlying the quarry contains fractures and fissures that constitute potential pathways for contaminant migration. Contaminants are currently migrating into the groundwater beneath the quarry, and radon gas concentrations and gamma exposure rates within the quarry and at the fence line are elevated above background levels.

In addition, some types of vegetation in the vicinity contain elevated levels of radioactivity. This contamination does not pose an immediate risk because site access is controlled, the nearby environment is continuously monitored, and corrective actions to protect human health and the environment would be implemented if warranted. However, if administrative control of the quarry were lost at some point in the future, exposure to the bulk wastes could potentially result in excessive health risks to persons frequently entering it.


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Procedures to protect human health and the environment will be implemented during the quarry bulk waste remedial action. The environmental pathway of most concern is atmospheric releases. Extensive control measures will be implemented during all phases of the action that could create airborne emissions. During excavation of the wastes, emissions will be controlled by water sprays, foams, and tarpaulins, as needed. The wastes will be transported to the chemical plant area in trucks along a dedicated haul road. Current plans are to package the wastes in containers to ensure minimal releases. Dust control measures similar to those at the quarry will be used while the wastes are being unloaded at the temporary storage area. Finally, all wastes susceptible to windblown erosion or release of radon gas will be covered as soon as practical following placement in the temporary storage area. These measures will ensure minimal atmospheric releases as a result of implementing this action and thus be protective of human health and the environment.

The selected remedy further protects human health and the environment in that it supports overall remediation of the Weldon Spring site by facilitating further investigations at the quarry area. These investigations are essential for evaluating the various response action alternatives for the quarry. An understanding of the nature and extent of fracture joints and fissures and associated soil and groundwater contamination can be established only after the bulk wastes have been removed. Hence, the proposed removal of bulk wastes from the quarry would facilitate the development of a comprehensive plan to address the issue of subsurface remediation in this area.

11.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS ...

Abbreviated section.

11.3 COST EFFECTIVENESS

The selected remedy is estimated to cost about $11 million and is expected to be implemented in 15 months. These figures, however, are based on conceptual estimates performed early in the RI/FS process and both are likely to increase as engineering design is completed. This remedy is cost effective since postponing the action could result in the continued spread of contamination in the quarry area. This would result in the need for a more extensive cleanup effort in the future. In addition, delaying action would result in higher costs due to inflation. Both of these effects will be minimized by implementing the selected remedy. In addition, this remedy would promote the effectiveness of remediation of the entire Weldon Spring site by facilitating detailed characterization of (1) the quarry subsurface to address follow-on remediation, and (2) the bulk wastes to support comprehensive waste management decisions for the entire Weldon Spring site.


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11.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

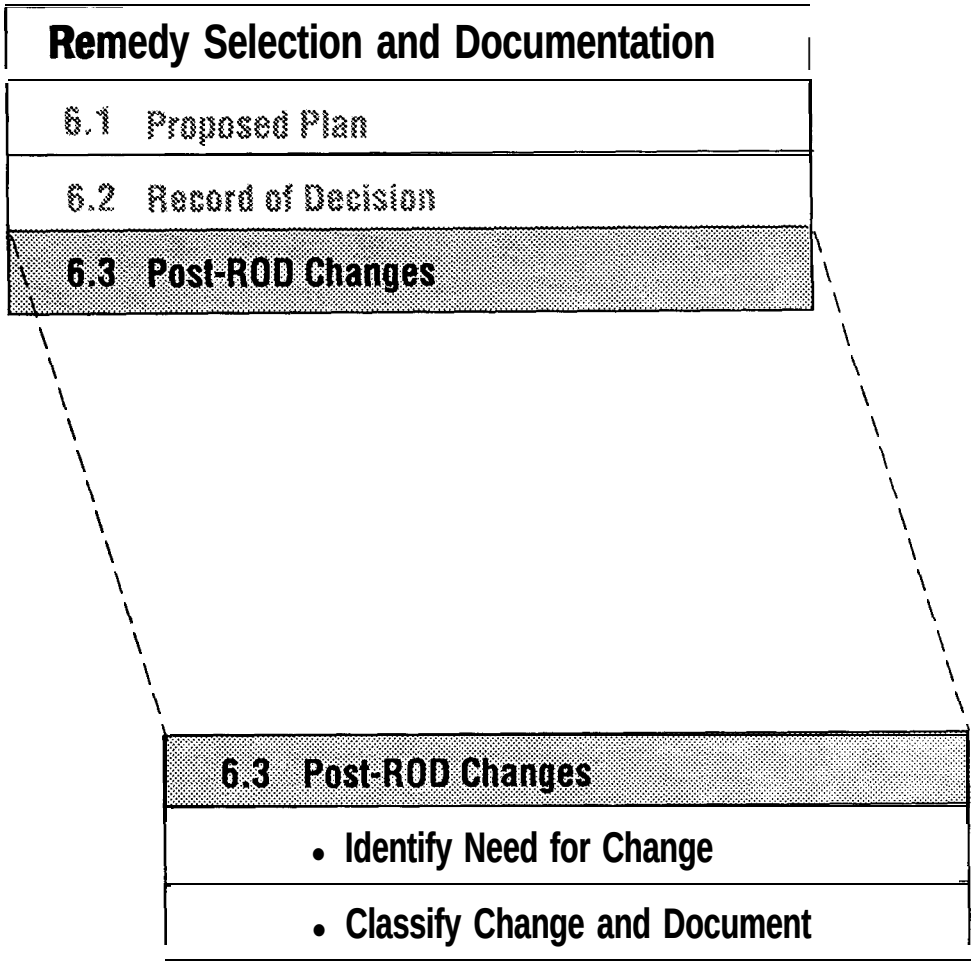
The selected remedy will result in the permanent removal of the bulk wastes from the quarry. This will remove the source of contaminant releases to the air and groundwater in the quarry area. The use of alternative treatment technologies or resource recovery technologies is beyond the scope of the quarry bulk waste remedial action. This action will not result in a permanent solution for either the quarry or the bulk wastes. A final decision for the quarry area will be made following removal of the bulk wastes (this action) and completion of detailed studies on the need to perform additional remediation in the quarry area. Treatment and disposal decisions for the wastes will be included in the RI/FS-EIS for remediation of the chemical plant area.

11.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

Treatment of the bulk wastes to reduce toxicity, mobility, and volume is beyond the scope of this action. The action is limited to excavation of the bulk wastes from the quarry with transport to, and temporary storage at, the chemical plant area. The wastes will be treated only to facilitate transportation and storage activities (e.g., segregation, dewatering). They will be characterized in detail after they are placed in controlled storage in the chemical plant area. The results of this detailed characterization will be used to finalize decisions on potential treatment strategies to reduce toxicity, mobility, and volume.

Statement addressing EPA's preference for treatment.

Submodule 6.3 Post-ROD Changes



Submodule 6.3 Post-ROD Changes

Purpose

To provide guidance on addressing and documenting changes to the selected remedy in response to new information or comments that become available during RD or RA.

Background

To facilitate streamlining, RODs need to be flexible in prescribing the selected remedy. A flexible ROD can support changes to the selected remedy during design investigations, detailed design, or remedial action more readily than RODs that are highly specific about the details of the remedy to be implemented.

Need for changes to the selected remedy can result from information received from the public, the support agencies, or DOE's own RD/RA efforts. Changes, especially those requiring ROD amendments, can substantially delay RA. The need to respond formally to the new information (especially if it is from the public or a support agency) is a judgment to be made by DOE and discussion, as necessary, with the extended project team. Generally, a change is warranted if all of the following conditions are met:

- The comments contain significant information
- The information is not contained elsewhere in the Administrative Record
- The information could not have been submitted during the public comment period
- The information substantially supports the need to significantly alter the response action

Following issuance of the ROD, three kinds of changes that require documentation can be made to the selected remedy. These are as follows:

- **Minor Changes** that require differences to be documented in the post-ROD file.

- **Significant Changes** that require the development of an ESD for inclusion in the Administrative Record. Significant changes are those that modify or replace a component of the selected remedy.

- **Fundamental Changes** that require the development of a ROD amendment and, thus, additional public comment. Fundamental changes are changes of the selected remedy that do not reflect the ROD with regard to scope (e.g., overall approach), performance, or cost.

Organization

Submodule 6.3 discusses the following:

- Identify Need for Change
- Classify Change and Document

In addition, more detailed information is provided in the following notes:

- Note A–Examples of Minor, Significant, and Fundamental Changes
- Note B–Example Explanation of Significant Differences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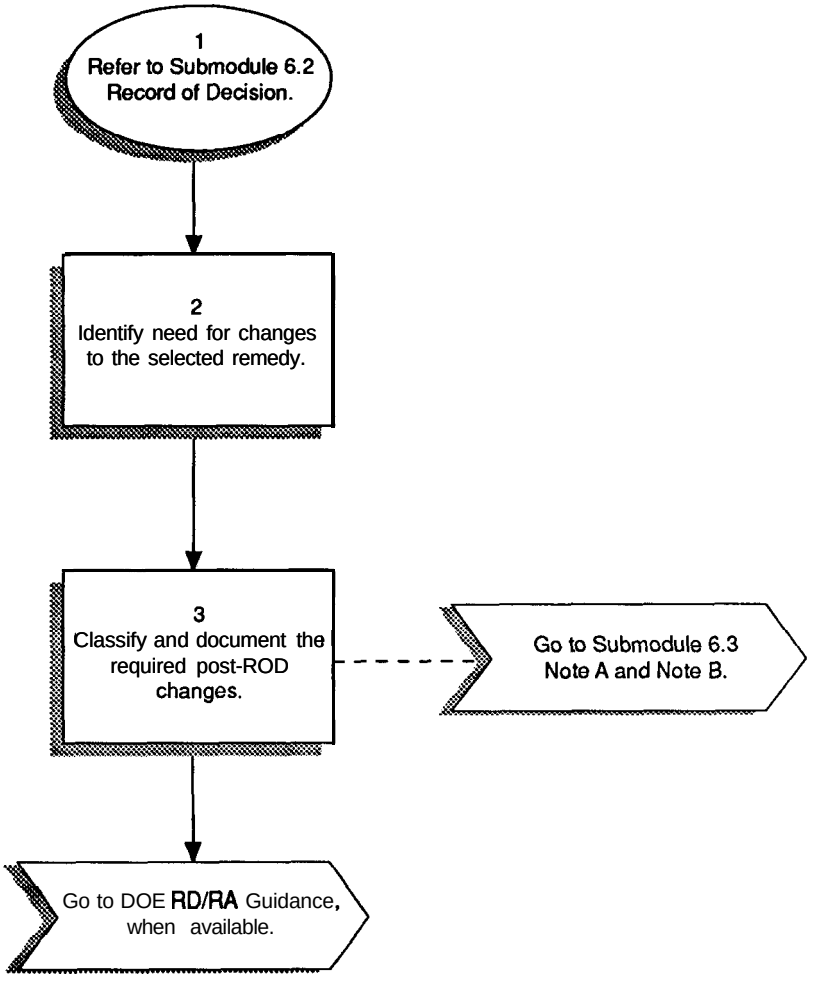
Sources

1. U.S. EPA, 1988, *Guidance on Preparing Superfund Decision Documents: The Proposed Plan and Record of Decision, Explanation of Significant Differences, and The Record of Decision Amendment,* Interim Final, OSWER Directive 9355.3-02.

Submodule 6.3 Post-ROD Changes



Step 1. Refer to Submodule 6.2, Record of Decision.

Step 2. **Identify need for changes to the selected remedy.** DOE must review the new information and decide if a change to the selected remedy is necessary. This decision should be coordinated with EPA and the State regulatory agency, as a minimum. Involvement of other stakeholders is discretionary, but may be useful in many instances, particularly if stakeholders are actively involved.

Step 3. **Classify and document the required post-ROD changes**. The ROD is a legally binding document. The following process has been established for modifying a ROD in response to changes during RD/RA.

- Memoranda to the post-ROD file are required when changes do not significantly affect the scope, performance, or cost of a remedy; these are considered minor or non-significant changes.

- An ESD is required to document **significant changes** that modify or replace a component of the selected remedy.

Significant differences require public notice, but not public comment or public input. Significant differences are addressed through publication of an ESD. The ESD documents post-ROD significant changes to components of a remedy.

The ESD should contain the following sections:

- Introduction
- Summary of Site History, Contamination Problems, and Selected Remedy
- Description of Significant Differences and the Basis for Those Differences
- Support Agency Comments
- Affirmation of the Statutory Determinations
- Public Participation Activities

During the time when the ESD is being prepared and made available to the public, DOE should proceed with the predesign, design, construction, or operation activities associated with the remedy. The remedy can continue to be implemented because the ESD represents only a notice of change. Because DOE is not reconsidering the overall remedy, an opportunity for public comment is not required.

- A ROD amendment is required to document **fundamental changes** that were not anticipated in the ROD and that affect the overall approach to remediation, not just a component of the remedy. Fundamental changes require reopening the public comment period through publication of a revised Proposed Plan and formal amendment to the ROD.

Submodule 6.3, Note A, provides example changes to help define the difference between minor, significant, and fundamental changes.

Submodule 6.3, Note B, presents an example ESD.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When fundamental changes are made to a remedy, DOE should repeat the ROD process in accordance with the requirements of CERCLA Section 117 by issuing an amended FS (including a new nine criteria analysis and ARARs analysis), a revised Proposed Plan, and an amended ROD.

When issuing a revised Proposed Plan and a ROD Amendment, the amount of information to include will depend on the type of change made to the remedy and the rationale for that change. In general, the introductory sections of the Proposed Plan and ROD (e.g., site history, community relations, and site risks) do not need to be readdressed. The focus should be on documenting the reasons for the ROD Amendment, evaluating the existing and proposed remedies in terms of the nine NCP criteria, and providing assurances that the modified remedy will satisfy the statutory requirements.

DOE is planning to issue RD/RA guidance.


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Note A. **Examples of Minor, Significant, and Fundamental Changes.** Specific examples of differences have been developed using the hypothetical remedy presented below. Major components of the remedy include the following:

- Excavation of 11,000 cubic yards of contaminated soil; treatment by thermal destruction; disposal in an onsite landfill
- Restoration of groundwater through air stripping/reinjection
- Provision of an alternate water supply
- Capital cost: $42,463,300
- Annual O&M: $26,200; present worth: $42,708,780
- Implementation time: 12 to 15 months

Minor Differences: In conducting engineering design and costing procedures, the lead agency refines the original cost and time estimates for the selected remedy in the ROD. The actual cost of implementing the remedy rises from $4.7 to $5.3 million, and the implementation time increases 6 months. Such refining of the time and cost estimates of remedies occurs through the usual course of remedial design at most sites. These changes are not significant differences; the lead agency is not required to prepare an ESD. Such changes should be documented in a post-decision document file and may be summarized in the RD/RA fact sheet.

Significant Difference: In the process of implementing the remedy, the lead agency conducts additional sampling and determines that the volume of soil to be incinerated is 50 percent greater than the volume estimated in the ROD. As a result, a proportional increase in capital costs of the remedy is realized. The capital cost increases from $4.6 to $7 million, and the amount of time necessary to incinerate the additional soil adds 3 years to the implementation time frame estimated in the ROD.

Because the scope and cost of the remedy have changed substantially from the specifications of the remedy in the ROD, an ESD is prepared to inform the public of the changes. Remedial design continues, because the lead agency determines the public has had an adequate opportunity to comment on the overall approach that the remedy represents (i.e., incineration and disposal in an onsite landfill). No public comment period is necessary.

Fundamental Difference: The lead agency determines that incineration capacity cannot be secured in the time period necessary for remediating the site. The lead agency proposes to use bioremediation rather than the thermal destruction originally selected to address the contaminated soil. This new remedy is fundamentally different from the remedy selected in the ROD, and an amended ROD must be prepared. Remedial design for the source control remedy is halted because the thermal destruction remedy is no longer implementable. Data collection to support the design of the bioremediation option and RD/RA on the groundwater remedy may proceed.


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Note B. **Example Explanation of Significant Differences.** ESDs and ROD amendments are the two types of post-ROD change documentation. ESDs consist of documenting the change that occurred, noting reasons for the change, and documenting effects. ESDs can be used for documenting a significant change or a minor change. Although a non-significant (minor) change does require formal documentation in the post-ROD file, it does not require public notice and comment. Amending a ROD involves developing a revised Proposed Plan, reopening the public comment period, and issuing a revised ROD.

This example is from an EPA site–the Whitewood Creek Superfund Site. The ESD was developed to document a change between the ROD and the remedy that was made prior to implementation. The changes became evident during RD and include changing from offsite to onsite disposal and clarifying definition of the phrase "existing residential areas."

This is an unedited example of an ESD that has been reformatted to facilitate development of this note. As discussed in Submodule 6.3, this example ESD is brief and focuses on specific changes.


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EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)
Whitewood Creek Superfund Site
Lawrence, Meade, and Butte Counties, South Dakota
United States Environmental Protection Agency, Region VIII
June 1991

Overview

Introduction.

The purpose of this document is to explain the significant differences between the remedy chosen in the *Record of Decision (ROD),* signed by the U.S. Environmental Protection Agency (EPA) on March 30, 1990, and the remedy which will be implemented at the Whitewood Creek Superfund Site (Site) located in west central South Dakota. (Terms appearing in italics are defined in the glossary.) EPA is the lead agency at the Site with assistance from the State of South Dakota's Department of Environment and Natural Resources which is the support agency at the Site.

The Site is currently in the *remedial design* phase of the Superfund cleanup process. Since design activities began, subsequent to the signing of the ROD, new information has been obtained which has resulted in the need for this *Explanation of Significant Differences (ESD).*

This ESD provides a brief background on the Site, describes the original remedy selected in the ROD, and explains the ways in which the modified remedy differs from the original. It also provides a summary of the support agency's comments on the changes to the remedy, discusses the modified remedy's compliance with all legal requirements, and provides details on how you can obtain more information or submit comments on the modified remedy.

This document presents only a summary of the changes to the remedy and a synopsis of information on the Site. The administrative record, which contains this ESD and the complete documentation, is available for public review at the locations indicated below.

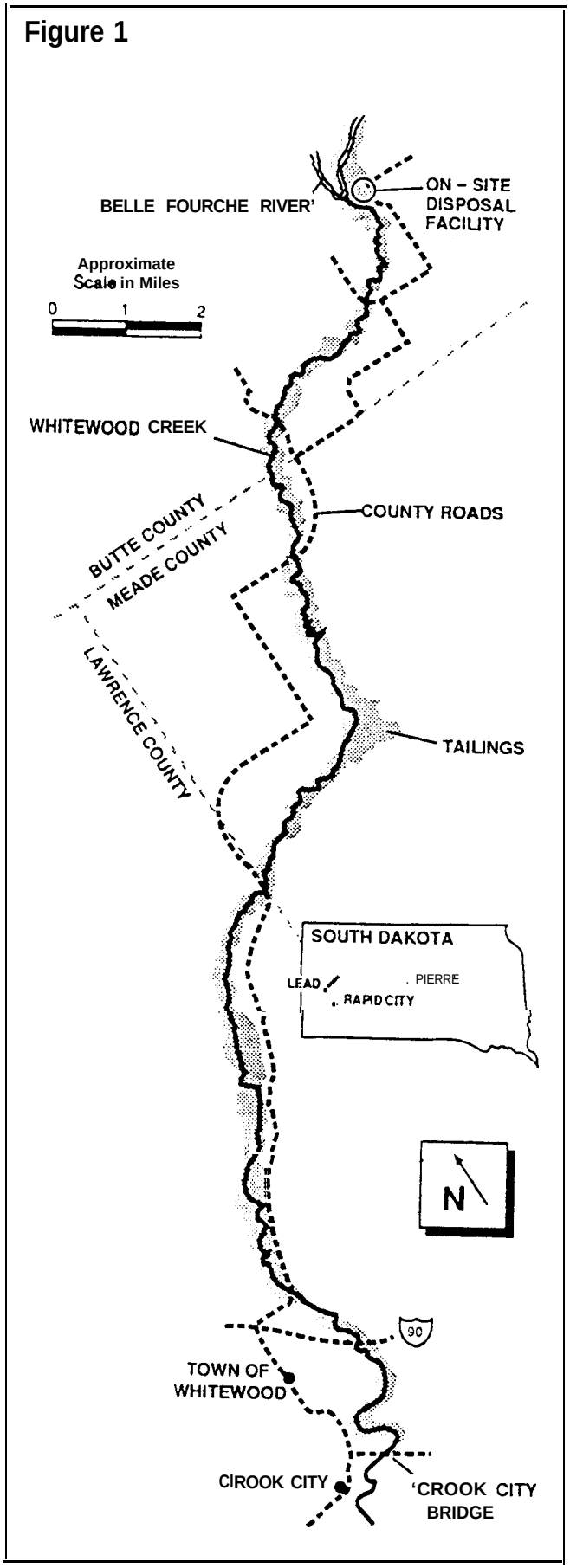
Explanation of Significant Differences

This ESD describes two changes to the remedy that will be implemented at the Whitewood Creek. Superfund Site:

1. **Arsenic**-contaminated materials removed from residential areas will be disposed in an on-site facility instead of an off-site facility.

2. The term "existing residential areas," as used in the ROD to describe those areas of the Site which will undergo soils cleanup during ***remedial action***, is to refer to areas in which residential land use is occurring at the effective date of county land use ordinances required by the ROD.

Figure 1


BELLE FOURCHE RIVER
ON – SITE DISPOSAL FACILITY
Approximate Scale in Miles
0 1 2
WHITEWOOD CREEK
COUNTY ROADS
BUTTE COUNTY
MEADE COUNTY
LAWRENCE COUNTY
TAILINGS
SOUTH DAKOTA
LEAD
PIERRE
RAPID CITY
N
90
TOWN OF WHITEWOOD
CROOK CITY
CROOK CITY BRIDGE

This ESD is prepared in fulfillment of EPA's public participation responsibilities under Section 117(c) of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 USC 9601 et seq. (CERCLA, more commonly referred to as Superfund), as amended by the *Superfund Amendments and Reauthorization Act of 1986* and Section 300.435(c) (2)(i) of the *National Contingency Plan*, 40 CFR Part 300.

Administrative Record Locations

Public participation information.

Lawrence County Registry of Deeds
6 Carney Street
Deadwood, South Dakota 57732
Hours: M-F 8:00 AM - 5:00 PM
Phone: (605) 578-3930

EPA Superfund Records Center
999 18th Street, Suite 500
Denver, CO 80202
Hours: M-F 8:00 AM - 4:30 PM
Phone: (303) 293-1807
Toll-Free No: 1-800-759-4372, ext. 1807

Comments or Inquiries

EPA encourages the public to submit their comments or questions about the modified remedy. Please submit comments by July 30, 1991 to:

Michael H. McCeney
Remedial Project Manager
U.S. Environmental Protection Agency
Mail Code: 8HWM-SR
999 18th Street, Suite 500
Denver, Colorado 80202
Phone: (303) 294-7169
Toll-Free No: 1-800-759-4372, ext. 7169

Site History and Background

Summary of site history and contamination problems.

The Whitewood Creek Superfund Site is located in west central South Dakota (Figure 1). The Site encompasses approximately 2,000 acres along 18 miles of the Whitewood Creek floodplain in Lawrence, Meade, and Butte Counties from the Crook City Bridge to the confluence of Whitewood Creek and the Belle Fourche River. Disposal of mine *tailings* containing arsenic and other metals resulted in contamination of soils, *surface water*, and *groundwater* throughout portions of the Site. The Site was placed on EPA's *National Priorities List (NPL)* of hazardous waste sites in September 1983 making it eligible for cleanup under CERCLA, or Superfund, as amended.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1In a three-party agreement, the Homestake Mining Company (Homestake), a *potentially responsible party* for contamination at the Site, EPA, and the State of South Dakota (the State) investigated the Site to determine the extent and nature of the contamination. This work, along with other related studies conducted at the Site, is documented in the *remedial investigation* report which is available at the information centers in Deadwood and Denver (listed on page 1). Results of these studies indicate that unacceptable levels of arsenic contamination exist in alluvial ground water, tailings deposits and residential soils located within the Site, and the surface water of Whitewood Creek.

Beginning in 1988, Homestake evaluated cleanup alternatives under the oversight of EPA and the State. This work was completed in December of 1989 and is documented in the *feasibility study* report which may also be found in the information centers. Following the studies and public comment on the proposed remedial alternatives, EPA, in accordance with Superfund regulations, selected a remedial action to be implemented. The selected remedy is set forth in the ROD.

After signing the ROD, negotiations began between EPA and Homestake for cleanup of the Site. In August of 1990, Homestake signed an agreement with EPA in which it agreed to:

1. pay $375,000 in past costs incurred by EPA at the Site;

2. under EPA and State oversight, conduct remedial design and remedial action at the Site in accordance with the ROD; and

3. pay all future costs incurred by EPA at the Site.

This agreement, in the form of a *consent decree*, was formally entered by the U.S. District Court for South Dakota, Western Division, on April 4, 1991.

Remedial design activities at the Site began in September 1990. In the course of conducting these activities, EPA has obtained new information which has resulted in the need for this ESD.

Summary of the 1990 Record of Decision

The objective of the remedy selected in the ROD is to reduce human exposure to arsenic-contaminated tailings, soils, and ground water at the Whitewood Creek Superfund Site. This remedy consists of the covering and/or removal of contaminated soils at existing residential areas and establishment of *institutional controls* to restrict access to tailings deposits and ground water. Implementation of these measures will reduce the risk to public health presented by residential soils, tailings deposits, and alluvial ground water contaminated with arsenic.


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The major components of the selected remedy include:

- Cover and/or remove soils in the existing residential areas containing arsenic levels of 100 *milligrams per kilogram (mg/kg)* or greater; contaminated materials removed during this activity would be disposed in an offsite disposal facility approved by EPA and the State;
- Restrict future development in the *100-year floodplain*, the tailings deposits, and areas containing tailings impacted soils through county ordinances regulating land use;
- Prohibit excavation of tailings deposits for other uses and prohibit excavation of remediated areas through county ordinance, although mining would be allowed subject to the regulations of the State of South Dakota;
- Refine knowledge of the extent of contamination and delineate the 100-year floodplain. Provide detailed maps to define Site boundaries and specify activities to support implementation of county ordinances;
- Set up an educational program to inform people about hazards presented at the Site and ways to decrease their personal exposure;
- Continue enforcement of the ban on installation of shallow *aquifer* water supply wells within the 100-year floodplain (this is already prohibited by a state regulation);
- Continue monitoring the surface waters of Whitewood Creek for significant releases of hazardous substances;
- Resample remediated residential areas after major flood events; and
- Review Site conditions no less often than each five years after initiation of remedial action, to ensure that human health and the environment are being protected by the remedy.

Description of Significant Differences

Description of significant differences.

The significant differences between the remedy described in the ROD and in this ESD are:

1. Contaminated materials removed from the residences during remediation will be disposed of in an <u>on-site</u> facility instead of an <u>off-site</u> facility.


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2. The term "existing residential areas" is to refer to areas within the Site where residential land use is occurring as of the effective date of county land use ordinances. This term was not explicitly defined in the ROD.

All other aspects of the 1990 selected remedy, as described above, remain the same. A more detailed description of the revised components to the remedy follows.

Change in Disposal Plan for Contaminated Materials

ROD Disposal Plan

Summary of selected remedy.

The ROD specified that arsenic-contaminated materials removed from the residences during remediation would be disposed in an off-site, permitted storage facility, such as the Grizzly Gulch Tailings impoundment located near Lead, South Dakota. A specific facility was to be chosen during remedial design.

New Information Since the ROD

Basis for the significant differences.

Since the issuance of the ROD, preliminary remedial design work has been conducted for the residential cleanup task. Homestake's remedial design engineer has estimated that the quantity of materials to be disposed will be less than 10,000 cubic yards. This estimate is less than one-third the amount (30,000 cubic yards) estimated during development of the ROD. The lesser amount of disposal materials is primarily due to the fact that, based on discussions with residents regarding their land use habits, a smaller area around each of the homes is to be remediated than was estimated in the feasibility study.

The Modified Disposal Plan

EPA's modified disposal plan involves construction of an onsite disposal area on property owned and controlled by Homestake situated at the northern end of the Superfund Site near the confluence of Whitewood Creek and the Belle Fourche River (Figure 1).

This disposal area will be designed and operated in accordance with all federal and state *applicable or relevant and appropriate requirements (ARARs)*, except for those in which a waiver is invoked. The disposal area, which will be approximately 7.5 acres in size, has been designed to be situated on an over bank deposit of mine tailings. These mine tailings have been shown to contain concentrations of arsenic ranging from 850 mg/kg to 10,000 mg/kg (contaminated materials to be disposed at the Site are estimated to contain an average arsenic concentration of 400 mg/kg).


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Contaminated soils and gravel removed from residential properties will be placed on the disposal area and revegetated with native grasses. Depths of this fill material will range from six inches to four feet. Other construction debris, such as removed fences and trees, will be consolidated adjacent to the fill area.

Disposal materials will be transported to the facility in accordance with all federal and state ARARs. Truck loads will be covered to prevent windblown dust. When disposal has been completed, a security fence will be constructed around the facility in order to restrict site access. Under the modified disposal plan, the on-site disposal facility will be available to homeowners and developers for disposal of arsenic contaminated material removed from Site properties during future construction activities.

Additional details about the modified disposal facility can be found in the Disposal Plan design documents contained in the administrative record for the Site.

Justification for the Change

EPA modified the original disposal plan for the following reasons:

1. The reduced distance for the disposal haul route will expedite the cleanup schedule by shortening the turnaround time for disposal activities. This will not only facilitate the process of achieving the cleanup objectives at the Site but will also reduce the overall cost of the remedy.

2. The modified disposal remedy will help reduce potential short-term risks associated with transportation of contaminated materials since the materials will be transported shorter distances, on rural county roads with significantly lower traffic volumes, and through areas more sparsely populated than the routes required for off-site disposal.

3. The relatively small area needed to place the waste materials (7.5 acres) can be easily designed and constructed on-site in accordance with state and federal landfill requirements and all other ARARs.

Additional details regarding the justification for this modified disposal plan and a determination of the ARAR requirements associated with the disposal plan can be found in Homestake's petition for the change submitted to EPA in a document entitled On-Site Disposal Plan for Contaminated Materials, Whitewood Creek Superfund Site, April 11, 1991, located in the administrative record for the Site.


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Definition of "Existing Residential Areas"

This ESD is also being used to clarify and define the term "existing residential areas" as used in the ROD. The remedy chosen in the ROD specifies that soil in existing residential areas containing arsenic concentrations of 100 mg/kg or greater shall be covered or excavated. Though not defined in the ROD the term "existing residential areas" implicitly refers to areas where residential land use was occurring at the time of signing of the ROD. However, two problems exist with this interpretation:

1. At the time the ROD was signed, it was not completely known which residential areas contained arsenic contaminated soils. The extent of arsenic contamination was not fully known and therefore further site characterization activities were specified to take place during design of the remedy (after the signing of the ROD).

2. Residential construction occurring in the Superfund Site after the signing of the ROD but before the effective date of county land use ordinances could take place without conducting soils cleanup activities. Therefore, a residence could be developed and continue to exist on an unremediated, arsenic-contaminated area. (After county land use ordinances are in place, as required by the ROD, it will be a developer's responsibility to ensure that new residential areas do not contain surface soils contaminated with arsenic above the 100 mg/kg *action level*.)

In order to correct these problems and to effectively achieve the remedial objectives set out in the ROD, EPA is defining "existing residential areas" to be those areas in which residential land use is occurring upon the effective date of the county land use ordinances required by the ROD.

Since the signing of the ROD, remedial design site characterization activities have occurred including soil sampling in known residential areas. To date, twenty-three widely scattered residential areas have been identified as containing arsenic-contaminated soils at levels above the 100 mg/kg action level. If, at the effective date of county land use ordinances, land use in any of these areas has changed from residential to non-residential, such areas will not be required to undergo soils cleanup during remedial action. Human exposure to arsenic contamination in such areas will be addressed through county land use ordinances.

Conversely, if any additional residential land development (since the signing of the ROD) occurs within the Superfund Site before the effective date of county land use ordinances, the property would be subject to soils cleanup activities in accordance with the ROD and this ESD.


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In order to expedite the cleanup activities at the Site, some of the twenty-three residential areas already characterized in the remedial design process are scheduled to be remediated prior to enactment of county land use

ordinances. This soils cleanup is scheduled to begin in the summer of 1991 in residential areas where EPA can reasonably determine, through coordination with the residents, that residential use of the area will not change.

Summary of Significant Differences

The major differences between the original ROD remedy and the modified remedy in this ESD are summarized as follows:

Original Remedy

- off-site disposal of arsenic-contaminated materials removed from residences
- "existing residential areas" not explicitly defined

Modified Remedy

- on-site disposal of arsenic-contaminated materials removed from residences
- "existing residential areas" is to refer to areas within the Site where residential land use is occurring as of the effective date of county land use ordinances

Support Agency Comments

The South Dakota Department of Environment and Natural Resources has reviewed this ESD and supports implementation of the modified remedy as set forth herein.

Statutory Determinations

Considering the new information that has been developed and the changes that have been made to the selected remedy, EPA and the State believe that the remedy remains protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to this remedial action, except those for which a waiver is invoked, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site.

Affirmation of statutory determinations. Support agency position.


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Glossary

100-Year Floodplain: An area that would be covered by water during a flood event estimated to occur once every 100 years.

Action Level: An amount of a contaminant in soil, air, or water at which EPA believes a response is necessary. Action levels vary from site to site and even within sites, based on potential exposures.

Administrative Record: The body of documents upon which EPA bases a cleanup decision about a Superfund site. By law, the administrative record file, which is the file containing the documents used in selecting the remedy for a site, must be made available to the public at a repository located near the Superfund site.

Applicable or Relevant and Appropriate Requirements (ARARs): Refers to the federal and state requirements that a selected remedy is required to attain. It includes requirements such as allowable air emissions limits and allowable levels of contaminants in site media (such as soils and water).

Aquifer: A layer of rock or soil below the ground surface that can supply usable quantities of water to wells and springs. Aquifers can be a source of water for drinking and other uses.

Arsenic: The contaminant of most significant environmental concern at the Whitewood Creek Superfund Site, arsenic occurs in many forms. At the Whitewood Creek Site, it occurs principally in the form of arsenopyrite (a naturally occurring arsenic-sulfide mineral) which is present in the ore body where gold veins are found. The tailings deposits at the Site contain concentrations of arsenic significantly above levels in uncontaminated alluvial soils. Dissolved arsenic is rapidly absorbed into the body following ingestion or inhalation and can affect the cardiovascular system, skin, or lungs. More detailed information regarding the health effects of arsenic may be found in the U.S. EPA Report No. 525/3-87/013, November 1987.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund): A law passed in 1980 that establishes a program to identify abandoned hazardous waste sites, ensure that they are cleaned up, evaluate damages to natural resources, and create claims procedures for parties who cleaned up the sites.

Consent Decree: A legal and enforceable agreement signed by the United States and the potentially responsible parties and entered as a court order by a judge. The decree at the Whitewood Creek Superfund Site describes activities to be conducted during the remedial design and remedial action phases of site work.


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Explanation of Significant Differences (ESD): Refers to a requirement of Section 117(c) of CERCLA, as amended, and the NCP, Section 300.435(c)(2)(i), that requires the lead agency, following adoption of the ROD, to document and explain any significant changes to the ROD. The ESD and supporting information must be made available to the public in the administrative record and information repository for the site. In addition, a public notice summarizing the ESD must be published in a major local newspaper of general circulation.

Feasibility Study (FS): A study required under Superfund in which alternatives for cleaning up site contamination are identified, screened, and compared.

Ground Water: Underground water that fills pores in soils or openings in rock to the point of saturation.

Institutional Controls: At the Whitewood Creek Superfund Site, this term refers to legal, non-engineering methods used to prevent or restrict use of, or access to, contaminated soils and ground water. In general, institutional controls may take the form of rules, regulations, laws, or covenants such as county or city ordinances, building permits, or other appropriate measures, as necessary.

Milligrams per Kilogram (mg/kg): A unit of measurement commonly used to express low concentrations of contaminants. This measurement is the equivalent of one part per million (ppm).

National Contingency Plan: A body of federal regulations governing the implementation of CERCLA.

National Priorities List: EPA's list of top-priority hazardous waste sites that are eligible for investigation and cleanup under the federal Superfund Program.

Potentially Responsible Party: An individual, company, or government body identified as potentially liable for cleanup of hazardous substances at a site. Under the Superfund program, EPA may hold liable any party that has generated or transported hazardous substances, as well as those who owned or operated a disposal facility, or those who currently own such facilities.

Record of Decision (ROD): A public document that sets forth and explains the cleanup alternative(s) to be used at a Superfund site. The ROD is generally based on information from the remedial investigation and feasibility studies, public comments, and community concerns.

Remedial Action: The actual construction or implementation phase of Superfund work during which the selected remedy is put into place.


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Remedial Design: The engineering phase of Superfund work following the Record of Decision that includes technical analysis and procedures which result in a detailed set of plans, technical drawings, and specifications for implementing the selected remedy during the remedial action phase of work.

Remedial Investigation (RI): A study required under Superfund that is conducted in order to identify the types, amounts, and locations of contamination at a site.

Superfund Amendments and Reauthorization Act of 1986: A law passed in 1986 that reauthorizes the Superfund law.

Surface Water: Bodies of water that are above ground, such as rivers, streams and lakes, as well as precipitation (rainwater or snow melt) flowing on the ground.

Tailings: The portion of mineral ores that is separated out during the milling of ore and disposed of.


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